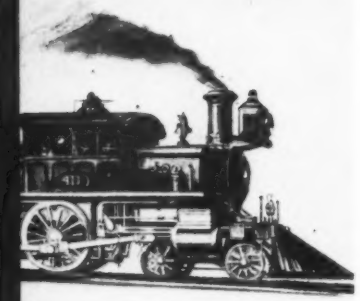
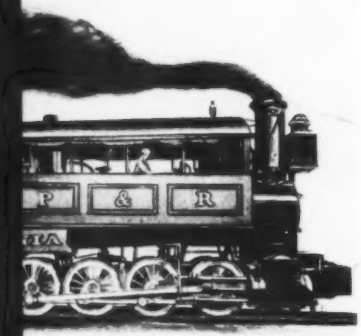
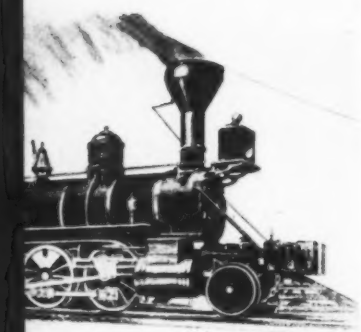
IMPROVED HIPOWERS ADEQUATELY PROTECT THIS VITAL PART OF TRACK.

IMPROVED HIPOWERS
IMPROVE TRACK

Reliance HY-CROME Spring Washers







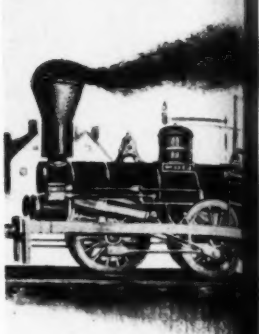
HY-CROME PRESSURE SPRING

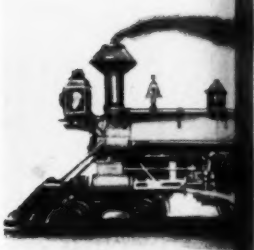
REACTIVE PRESSURE maintained over an adequate range is more important than initial tension, which may dissipate through fatigue or permanent set.

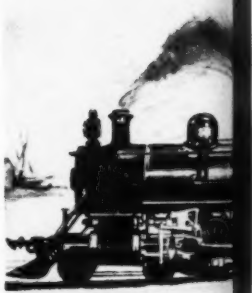
REDUCTION or elimination of wear or excessive movement in joint parts through looseness is possible, if HY-CROME PRESSURE SPRINGS are used.

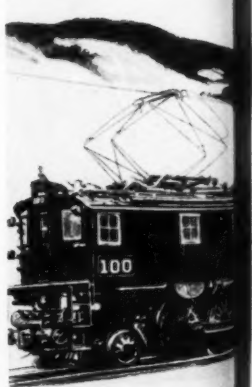
•

We look forward to seeing you at Booth 31, at the N.R.A.A. Exhibit, International Amphitheatre, during the A. R. E. A. Convention, March 10th to 13th.









EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON.

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

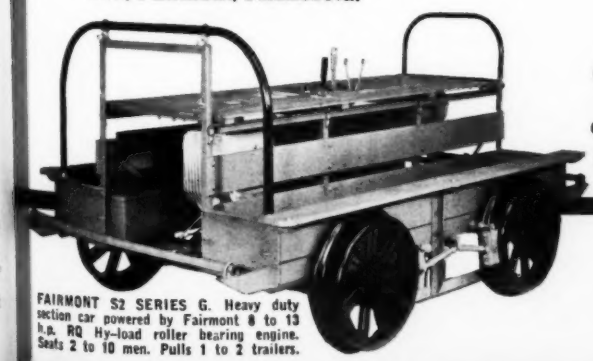
Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

Woodings-Verona Tool Works

Verona V&W **Pa.**

CARS THAT HE NEVER OILS HELP MAKE HIS RUN *Safe* THROUGH *Fog, Rain and Snow*

CARS that are never in the engineman's string contribute as much to the safety of his run as the routine inspections that are made at each stop. For these cars are the advance guard that carry inspectors, roadmasters, and track supervisors on their regular "check-up" of road-beds, tracks, and bridges. They are the cars that transport section gangs in their daily maintenance work, so that trains may operate on schedule. They are the cars that carry signalmen over the line to insure uninterrupted operation of semaphores and other protective devices. Of all the cars serving in this important branch of railroading, more than half are Fairmonts. This fact is sound proof of the thoroughly dependable and economical performance of Fairmont equipment under all conditions. Fairmont Railway Motors, Inc., Fairmont, Minnesota.



FAIRMONT S2 SERIES G. Heavy duty section car powered by Fairmont 8 to 13 h.p. RQ Hy-load roller bearing engine. Seats 2 to 10 men. Pulls 1 to 2 trailers.

Fairmont
RAILWAY MOTOR CARS

Performance
ON THE JOB
COUNTS

FLEX-TOE Will Pull Spikes Like These Out of Your Track . . .

- MOVABLE TOES GRAB SPIKES
- HOLD TIGHTLY
- NO DRIVING NECESSARY . .

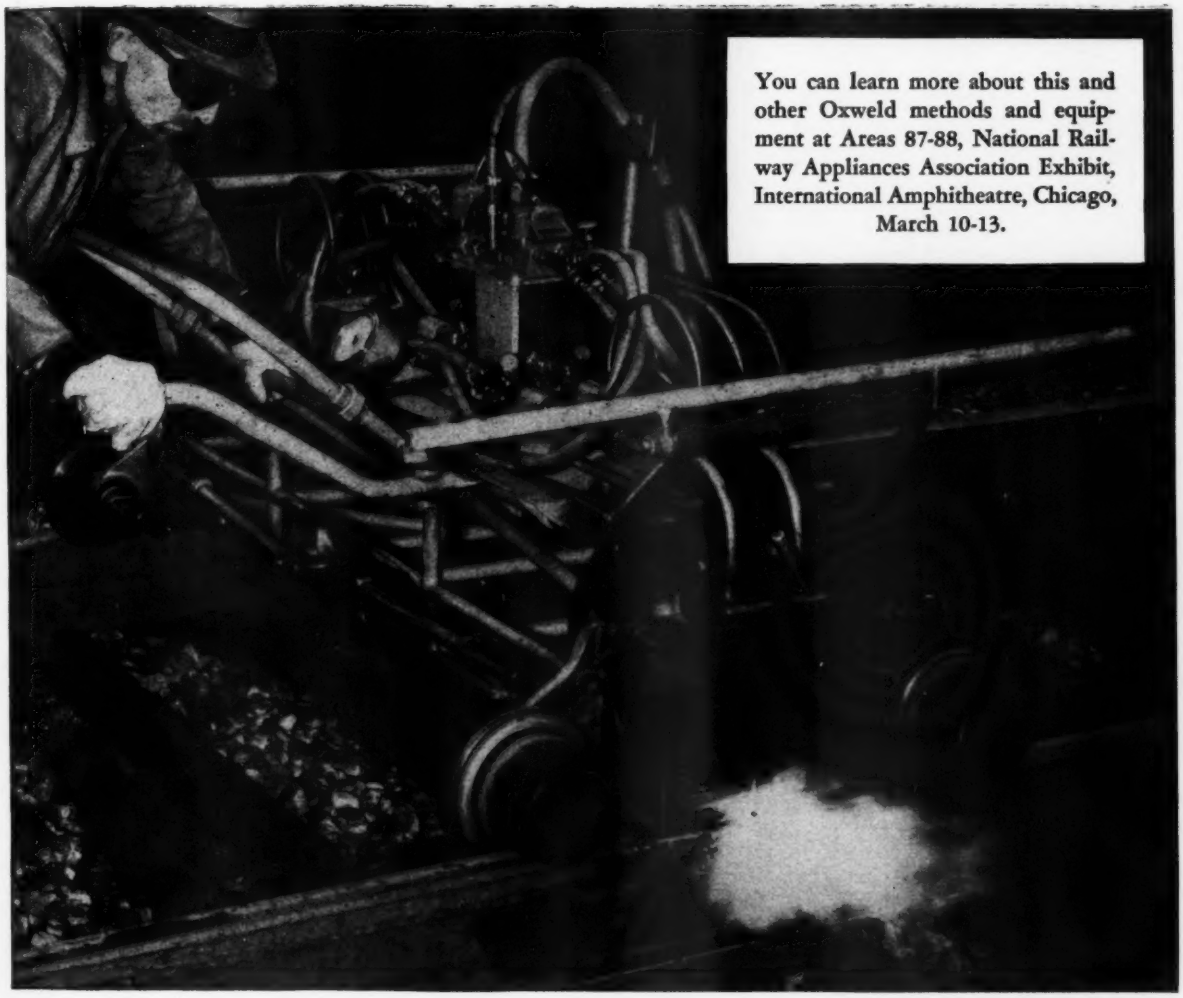
Faster and Safer Way To Pull Spikes

SEE those spikes above? They were actually pulled with a Flex-Toe Claw Bar by ONE MAN without a helper. This new bar not only removes brine-eaten and headless spikes or bolts, but also the ordinary kind faster and safer. **There's nothing new to learn.** Flex-Toe is thrown onto spikes in the usual way. Movable toes grab hold of any piece of protruding metal. **There's nothing to adjust.** As the handle is pulled, the toes take tighter hold and the spikes or bolts come out. **No driving is necessary.** These features were developed in the Flex-Toe Bar to speed spike pulling operations, provide a means of pulling spikes of ALL kinds, and to materially increase safety. Flex-Toe is receiving favorable and wide general acceptance. And remember, your claw bar costs will go down plenty when you use Flex-Toes.

You Only Need To Replace The Toes

Manufacturers of The Famous Devil Line of Track Tools

WARREN TOOL CORP.
WARREN, OHIO



You can learn more about this and other Oxweld methods and equipment at Areas 87-88, National Railway Appliances Association Exhibit, International Amphitheatre, Chicago, March 10-13.

End Harden Rail in Track
BY THE OXWELD METHOD

• The Oxweld method provides an economical and efficient means of end-hardening rail in track. This method produces a batter-resistant rail end of uniform hardness adequate for the rail service requirements. The work can be performed in track at low cost and without interrupting traffic. The Oxweld equipment for end-hardening rail is kept up-to-date and efficient in order that Oxweld may provide the best possible service for American railroads.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark of a Unit of Union Carbide and Carbon Corporation.

CURE

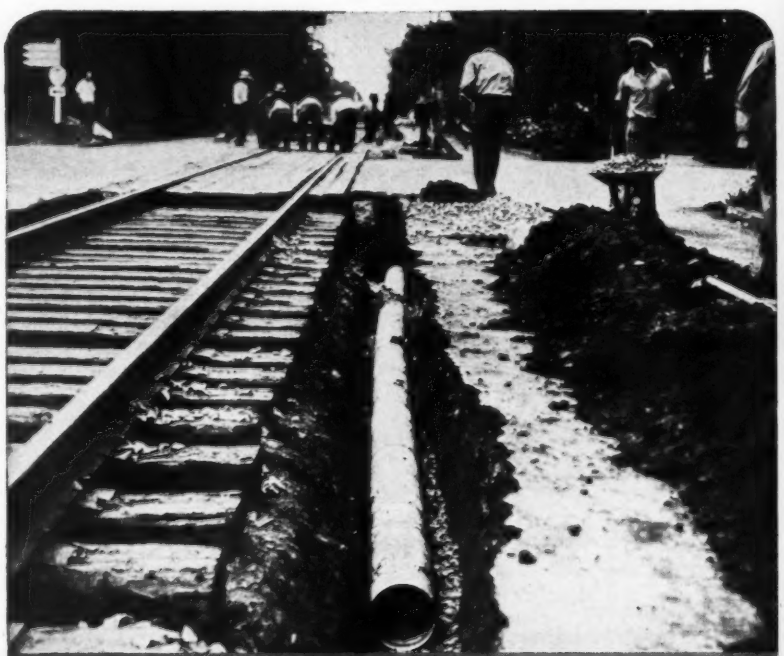
FOR WISHY-WASHY SUBGRADES!

Complaints that this crossing foundation was "weak as water" were well justified. That was the trouble exactly. Groundwater "diluting" the subgrade caused continued and expensive maintenance. Yet after other remedies had failed engineers found an ideal cure in ARMCO Perforated Pipe. The crossing was stabilized and maintenance returned to normal.

Use ARMCO Pipe to intercept and remove harmful groundwater—the generally accepted cause of 80% of all surface failures. You'll have a lasting improvement that soon pays for itself. Roadbeds stay dry and firm the year around.

Shifting soils, traffic impact and severe frost action are no hazards to ARMCO Perforated Pipe. Crushing or disjointing is out of the question. The flexible corrugated design and tightly coupled joints see to that. Long material life is also assured. Galvanized ARMCO Ingot Iron has proved its durability in 35 years of under-the-track service.

Try ARMCO Perforated Pipe the next time you are troubled with wet, unstable foundations. One trial will convince you of its many practical advantages for subdrainage work. Write for prices and complete data. Armco Railroad Sales Co. Inc., 381 Curtis St., Middletown, O.



This crossing was rough, usually wet, and required almost constant maintenance. Heavy trains caused a pumping action that brought water to the surface even during the driest seasons. A concrete slab more than a city block long failed to remedy the condition. Yet 2600 feet of ARMCO Pipe drained the water and saved upkeep dollars.

ARMCO PERFORATED PIPE

PLAY SAFE IN 1941

This year the railroads will face one of the biggest jobs in their history, and heavier traffic and higher train speeds will undoubtedly increase interference with track work and add to the demands on track labor.

WHY NOT anticipate this condition and complete TIE RENEWALS weeks, or even months, ahead of the normal time required for the most costly and time-consuming job on your program, by mechanizing your crews with WOOLERY TIE CUTTERS?

These machines not only simplify and speed up the work, but they also cut costs 30% or more . . . as proved in the renewal of more than 2,000,000 ties last year. Let us show you the figures.

Retamping is practically eliminated—the compacted bed of the old tie is not disturbed—the track surface is not affected.

We will gladly demonstrate. Send for 12-page booklet.

The WOOLERY TIE CUTTER cuts the old tie in three pieces which are easily LIFTED OUT. Above is shown an end section of an old tie that has been removed. Note the undisturbed crib and the compact bed on which the new tie will rest.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

ON EXHIBIT
NATIONAL RAILWAY APPLIANCES SHOW
MARCH 10-13

UNIT TYTAMPERS

will provide you with the most flexible, convenient and efficient method of maintaining *best possible track* to meet the demands of increased business, higher speeds and heavier loads at lowest possible cost.

Each unit is entirely self-contained and easily carried by one man—no auxiliary equipment is needed—initial capital expense is low. Units can be quickly assembled for gang tamping, or readily distributed to section gangs for spot tamping.

FIVE YEARS SATISFACTORY SERVICE — NOW USED BY 68 RAILROADS

BARCO MANUFACTURING CO.

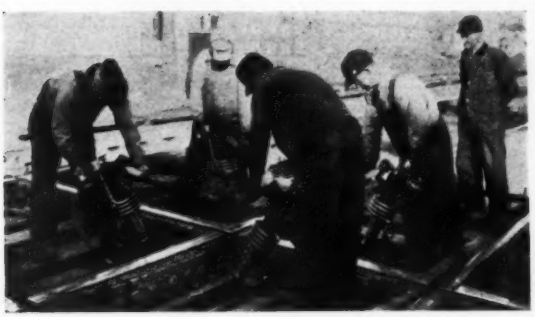
NOT INCORPORATED

1805 W. Winnemac Ave. Chicago, Ill.

IN CANADA:

THE HOLDEN COMPANY, Ltd.

Montreal - Moncton - Toronto - Winnipeg - Vancouver

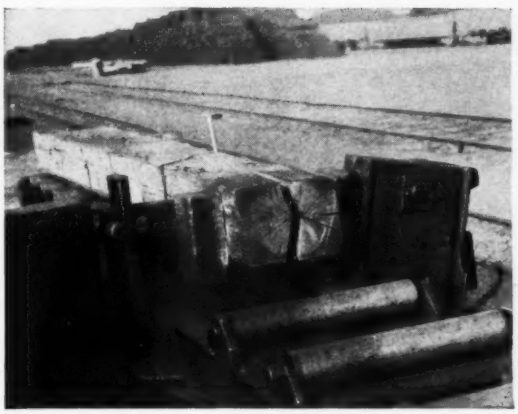


Spot tamping at busy terminals and crossings is quickly and easily handled—no auxiliary equipment in the way.

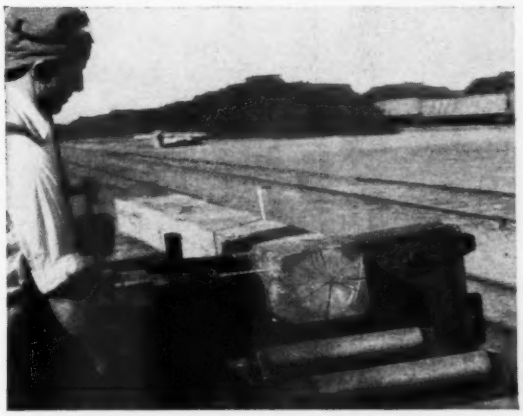
BARCO Tytampers may also be operated from a small light-weight central power plant for out of face tamping, as shown above. This unit, weighing less than 100 lb., and costing less than $100, is supplying power to 12 BARCO Tytampers.

BIG SAVINGS

NO RAILROAD MAN CAN AFFORD TO IGNORE THE OBVIOUS ECONOMY OF THE GIANT DOWEL



1 Here the badly split tie is placed in the "Squeezer" where it will be pulled together tightly.



2 Now the tie has been pulled together under pressure and the holes are being bored for the dowels.

3 Here the Dowel is being driven into the pre-bored holes—every dowel grips and holds tight.

4 The "Squeezer" is released and the tie is in prime condition ready for a lifetime of service.

Write today for full information

GIANT REINFORCING DRIVE DOWELS

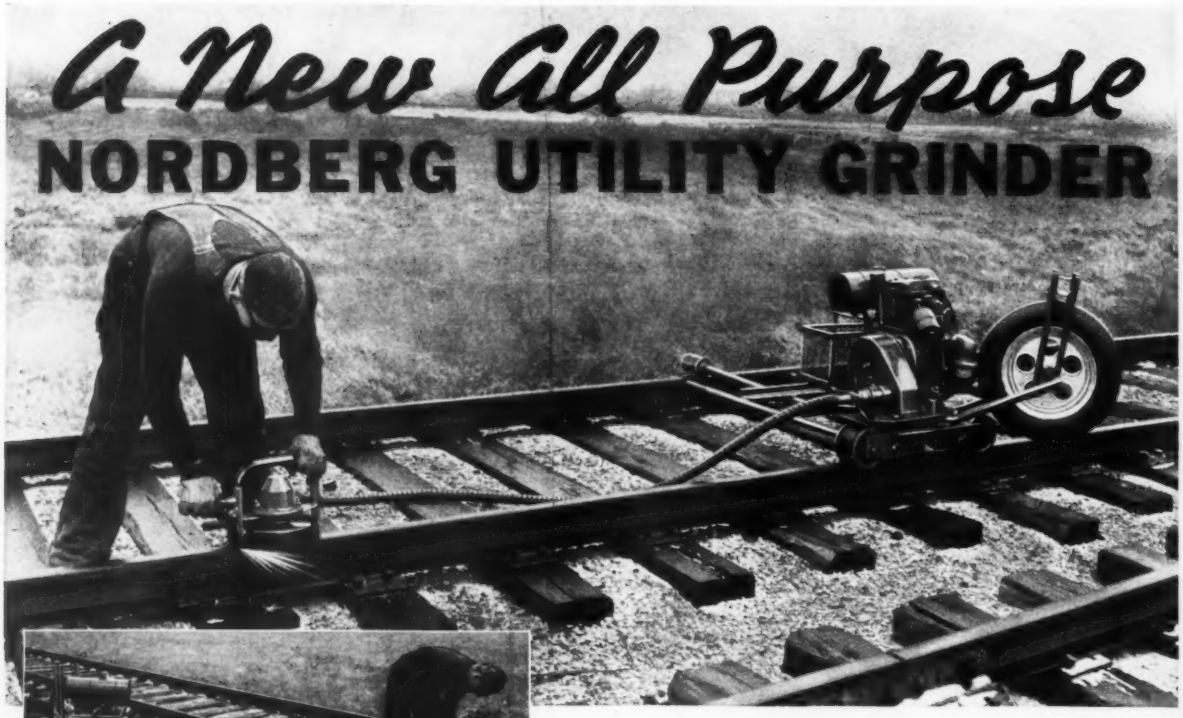
PITTSBURGH
SCREW AND BOLT CORPORATION
PITTSBURGH, PA.

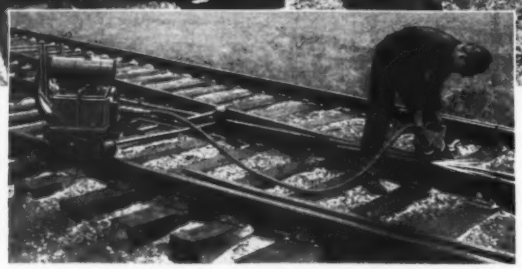
GARY
SCREW AND BOLT COMPANY
GARY, IND.—CHICAGO, ILL.

American Equipment Corp. . . . . Norristown, Pa.

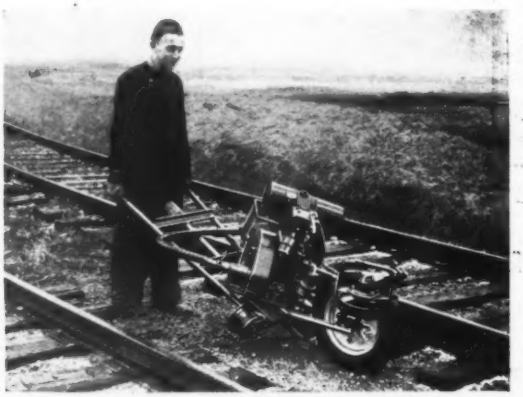
DISTRICT OFFICES: International Building, New York, N. Y. . . . . General Motors Building, Detroit, Michigan . . . . . N. B. C. Building, Cleveland, Ohio . . . . . Post Office Box 222, Savannah, Georgia . . . . . Republic Bank Building, Dallas, Texas

A New All Purpose NORDBERG UTILITY GRINDER





With the various accessories, this grinder can be used for beveling rail ends, grinding welded joints, removing mill tolerance or flow from switchpoints and stock rails, opening flangeways, doing miscellaneous grinding at frogs and crossings, and boring holes for cut or screw spikes.



So balanced to handle as easily as a wheelbarrow.

Compact Design

Compact design provides greater operating convenience and easier handling. Has more clearance when set in the intertrack space.

Full-Revolving

Engine and drive fully revolves on the carriage. Short bends of the flexible shaft are eliminated, greatly prolonging its life.

Simplified Drive

Flexible shaft is driven by a ball bearing mounted friction drive of simple design which requires minimum care and maintenance. Friction members are held in contact with a compression spring which allows drive to slip and protect shaft should wheel become snagged. Drive can be instantly released by a convenient lever.

More Easily Transported

Because of its improved balance, the grinder can be easily moved along the rails on the flange rollers and insulated stabilizing bar, or pushed over the ballast on its oversize pneumatic tire.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

1000 gallons for 8/10¢

on the ILLINOIS CENTRAL

...G-E VERTICAL HOLLOW-SHAFT INDUCTION MOTORS

furnish this low-cost power with minimum trouble and maintenance

AT GWIN, MISS., Illinois Central is pumping water from wells 400 ft deep, using two 150-gpm Layne turbine pumps. Each pump is driven by a G-E 5-hp vertical, hollow-shaft, weatherproof 1750-rpm motor. Pump settings are 30 ft from the surface.

These pumps are producing 7,000,000 gallons of water monthly at an average consumption of .316 kw-hr per 1000 gallons. Power cost at 2.5¢ per kw-hr is $0.0079 per 1000 gallons—real proof of electric-drive economy.

Economical performance is one big reason behind I.C.'s O.K. on electric drive. This road has electric-pump installations in 53 water stations, of which 27 are supplied by deep-well systems. A total of more than 160 electric motors are helping its fast trains keep their water-service time to the minimum.

Note these Money-saving Features

- ✓ The installed cost is less than ½ that of comparable steam or oil installations.
- ✓ Automatic and remote controls require little attention, free water-service men for other duties.
- ✓ The quick, easy availability of this motor's parts reduces inspection and maintenance costs.
- ✓ This electric motor's suitability for outdoor installations can reduce first cost and maintenance expense.

Consult your G-E representative about this modern drive for pumping stations. He will welcome an opportunity to explain how these G-E motors can save you money and assure reliable service, just as they are doing for an ever-increasing number of American railroads. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

No. 146 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

February 1, 1941

Subject: Two Kinds of Magazines

Dear Reader:

"Going on vacation. Please get my magazine out. Insert any material your judgment dictates." Thus read a telegram received by our printer some time ago from the editor of another magazine printed in the same plant that produces Railway Engineering and Maintenance. And our printer boasts with some pride that when this editor returned from his vacation, he was greatly pleased with the issue.

As I heard this story and recognized that some, perhaps a considerable number, of magazines are edited in this indifferent manner, I realized also that it does not reflect the care with which the best business papers of today are prepared. Yet I wonder if you appreciate how highly specialized is the task of editing a paper such as Railway Engineering and Maintenance.

In the first place, this work demands an intimate knowledge of the problems and the practices of railway maintenance men in order that the editors may be able to detect and segregate the new from the commonplace in materials and procedure. Then they must have the ability to describe what they find in simple understandable language. Their task demands, furthermore, that they familiarize themselves with the possibilities – and the limitations – of the engraving and the printing industries in order that they may present their "stories" in attractive, readable form.

To be specific as regards Railway Engineering and Maintenance, the selection and preparation of the editorial material that is brought to you each month requires the larger part of the time of five editors, all with years of railway maintenance service before joining our staff and with a combined experience in railway and editorial service exceeding 120 years. And these editors travel more than 75,000 miles a year to keep in contact with you and gather information first hand regarding your work and your interests. Furthermore, these editors exercise meticulous care in all the many steps incident to the production of your magazine, down to such detailed precautions as the reading of all manuscript by two editors to detect errors, etc.

No, our printer, efficient though he is, cannot edit Railway Engineering and Maintenance. Like your own work, it requires specialists.

Yours sincerely,

Elmer T. Howson

ETH:EW

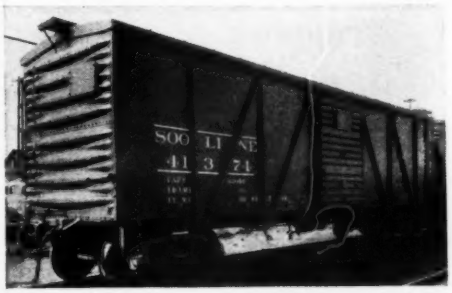
Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

HOW SOO LINE MODERNIZES FREIGHT CARS WITH PLYWOOD

New cars from old! That's what the Soo Line achieves with the aid of Douglas Fir Plywood. Take this veteran of the rails, No. 41734, for example. Tongue and groove boards were removed, leaving the frame bare.

Big panels of Douglas Fir Plywood were installed on the outside of the car, forming a trim, neat exterior. The interior walls were also lined with plywood to keep out cinders and protect ladings from damage.



A few coats of paint . . . and behold! Old No. 41374 gleams like new. It's far more rigid than when new . . . carries a larger load because plywood helps turn part of structural load into payload.

Thanks to the plywood lining, ladings will arrive in better condition. The tight, smooth panels keep out dirt, cinders and smoke, minimize condensation, help reduce damage claims. Modernize with Fir Plywood!

You're sure of a BETTER JOB when specifications call for DOUGLAS FIR PLYWOOD

● Douglas Fir Plywood has advantages of large size, great strength, light weight, damage-proofness and smooth surfaces no other material can equal. Coupled with these advantages is downright economy. For Douglas Fir Plywood reduces labor, saves time, gives longer service and minimizes upkeep and damage claims. It will pay you to use plywood for every building and modernizing job.

You can easily specify and identify the proper type of Douglas Fir Plywood for each of your jobs. Every panel from Association Mills is manufactured in strict accordance with U. S. Commercial Standard CS45-40 and is stamped with a distinctive "grade trade-mark." Learn these marks. Use them. Listed below are suggested specifications. For further information or free literature, write Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington.

STATION BUILDINGS PLYWALL builds puncture-proof walls and ceilings, 3/8" recommended, but economical 1/4" adequate for new construction or covering cracked plaster. 5/16" PLYSCORD recommended for wall sheathing, 5/16", 3/8" or 1/2", depending on rafter spacing and roof load, for roof decking under shingles, tile, composition roofing, etc. 1/2" or 5/8" for sub-flooring.

Specify PLYPANEL for finest paneling, cabinets, furniture and for partitions where both sides are exposed to view.

Specify EXT-DFPA for exterior siding of buildings, refrigerator cars and other uses where permanently waterproof plyboard is required. Bond between plies is impervious to moisture. 3/8" or 1/2" recommended. For more information, write for free Dri-Bilt Manual and Grade Use Guide.

CAR LINING 3/4" PLYPANEL (SO2S) most widely used for freight and baggage car lining. PLYFORM grade also popular. 5/16" PLYPANEL for ceilings. PLYPANEL (G1S or G2S) for fine paneling in passenger and dining cars. Write our Technical Division for specific recommendations.

CONCRETE FORMS PLYFORM, either 5/8" or 3/4", is ideal concrete form material. Gives numerous re-uses, satin-smooth surfaces. Free Concrete Form Manual contains full details.

DOUGLAS FIR PLYWOOD
Real Lumber
MADE LARGER, LIGHTER
SPLIT-PROOF
STRONGER

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

GENUINE PLYSCORD SHEATHING D.F.P.A.

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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

FEBRUARY, 1941

FOR LOWER COSTS

on Reconditioning Crossings and Frogs

...use these time-proved AIRCO methods

Worn Frogs and battered rail ends are quickly reconditioned with the Airco Oxyacetylene Process — then heat-treated with the same torch for longer life. These operations may be done either in the shop as illustrated, or, on the road if desired. They are but two of the many ways in which the Airco Oxyacetylene Flame is cutting maintenance costs from coast to coast. » » » The practical experience and advice of the members of our Applied Engineering Department is at the service of Airco's railroad customers for problems such as rail end cropping, building up rail ends, hard surfacing, flame cutting locomotive and car parts, or in any other service in which Airco methods can be of assistance to you.

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General Offices: **60 EAST 42nd ST., NEW YORK, N. Y. DISTRICT OFFICES IN PRINCIPAL CITIES**

● SERVING RAILROADS FROM COAST TO COAST ●

Railway Engineering and Maintenance

Ready?

Are the Railways Prepared?

OUR nation is now in the early stages of the greatest program for national defense that the world has ever seen. Plants for the making of munitions; plants for the construction of airplanes, tanks and guns; camps for the housing of thousands of recruits; plants for the production of materials essential to all these activities are being rushed to completion in dozens of communities. In many respects, our country is rapidly changing over from the pursuits of peace to those of preparation for war.

In every step of this evolution transportation is an essential element and the responsibility for providing this transportation rests in largest measure with the railways. For this reason a question that looms large in the minds of the public relates to the ability of the railways to meet these needs. In other words, they are wondering whether the government may consider it necessary, as it did in the last World War, to take over the operations of the railways. Railway employees should be prepared to provide the answer to this thinking in order that there may be no undue hysteria in this period of national emergency.

The Trouble in 1917

In this thinking, the first point to make clear is that, contrary to public opinion, the collapse of transportation in 1917 was not due to any inadequacy of railway facilities. Rather, it was due to the misuse of the facilities until at one time more than 200,000 cars were standing still under load, blocking terminals and interfering seriously with the movement of other traffic because consignees were unable to unload and release them.

This condition resulted from a lack of co-ordination in the purchase and procurement of supplies and in arranging for their transportation by the War and Navy departments, a situation which has since been corrected through complete coordination between these departments and the railways, with the result that materials are being loaded into cars only when it is known that these cars can be unloaded promptly upon arrival at destination. As a result of this control, traffic in many areas is today moving in volume approaching war-time proportions with complete absence of congestion.

Furthermore, while the railways today have only 42,500 locomotives, or 21,000 less than in 1918, employees can emphasize the fact that while the *number* of locomotives has decreased 33 per cent, their average tractive power has increased 43 per cent. Likewise, while the *number* of freight cars has declined 28 per cent, the capacity of the average freight car has increased 20 per cent, the average speed with which that car travels in trains has increased 62 per cent and the net ton miles per freight car day, the measure of traffic output, have increased 36 per cent. Rather than indicating a decrease in facilities, as compared with 1918, it is evident, therefore, that the railways now have the facilities to render *more* transportation service and to handle *more* traffic than ever before.

And what the railways have done in the improvement of their equipment they have also done with roadway, for in the last two decades they have spent more than $10,000,000,000 in the improvement of their facilities, 55 per cent of which went for improved and more adequate roadway facilities and 45 per cent for equipment. These roadway expenditures have gone for heavier rail, for more and better ballast, for improved drainage, for additional tracks and signaling facilities, where needed; in fact, for all of those facilities that go to make up a modern railway.

In studying the transportation facilities of our country we also face the fact that in the interval since the last World War other agencies of transportation have been developed which share this burden to some extent. These include a network of more than 1,000,000 miles of surfaced highways, which are now carrying about 9 per cent of our freight traffic; more than 100,000 miles of pipe lines which are carrying more than 14 per cent of our traffic; and the inland waterways, including the Great Lakes, which are now carrying 14 per cent of our traffic. All of these facilities are available to share in handling peak traffic.

Traffic Peaks Not Novel

But peaks in traffic are not new for the railways. They occur every year. As recently as 1939 the increase in traffic from the low week in May to the high week in October was 55 per cent. In 1940, a more normal year, the number of loaded cars handled in the week of heaviest traffic was 19.2 per cent larger than the weekly average for the year. And the best estimate that can be made of the total increase in traffic to be expected from our national defense program approximates 10 per cent.

Furthermore, the greatest increase in traffic to be anticipated in 1941 is not that resulting from the program of national defense but rather that coming from the stimulation in normal industrial traffic that may result from these increased expenditures.

That the railways have not been oblivious to the possibilities of these developments is indicated by the fact that their capital expenditures were 53 per cent larger last year than in 1939, and 76 per cent more than in 1938. They likewise bought and placed in service more than 60,000 freight cars and almost 400 locomotives in 1940, while more than 30,500 additional freight cars and more than 180 additional locomotives were under construction at the end of the year. Furthermore, more than 12,000 additional cars and 34 additional locomotives have been ordered during January.

Recent Achievements

Are these preparations adequate? Let us look at a few recent performances. Last August the railways moved 150,000 soldiers from widely scattered areas into training camps in a little more than three days—a larger movement per day than occurred during the peak month of the last World War. And these men were moved with a precision that drew the enthusiastic commendation of military officers.

Again, during the last war, the greatest congestion occurred at and near the eastern ports. Yet within recent months the volume of freight traffic moving through Atlantic and Gulf ports has approximated two-thirds of the peak volume of the first World War and there has been no time at which more freight could not have been handled at practically every port. It is especially significant that only about 31 per cent of the railroads' storage space in the Port of New York is now being utilized, and this condition is typical of other ports.

Commendation from War Department

In view of the improvements in roadway and other facilities, the increases in operating efficiency, the precautions taken to conserve equipment for transportation rather than storage purposes and the recent purchases of cars and locomotives, it is not surprising that those who are bearing the responsibilities of national preparedness are showing no concern over the ability of our transportation system as a whole, and especially the railroads, to meet any demands that may reasonably be made on them. It was this recognition that caused Louis Johnson, then assistant Secretary of War in charge of preparedness activities, to say on April 26, 1940, that "we in the War department have full confidence in the innate capacity, in the co-operative spirit, in the ability and in the patriotism of our railways to cope successfully with the transportation problems that any grave military emergency would involve. You railroad men have created and perfected an organization that meets the demands of war under private individual management. There is no place in our plan either for government operation or for government ownership. Government operation is especially distasteful to us. The Army is not organized to run the railroads. It does not want the job."

To railway men, especially in the maintenance of way department, emergencies comprise no new experience. Whether they arise from wrecks, snow blockades, washouts or from other causes, they call for and bring out the best in a railway organization and in the men who comprise that organization. It is these crises that have developed the capacity for endurance, loyalty and, if needed, superhuman effort that through the years have caused men to fight sleet and snow and bitter cold in order to keep trains moving through many a long winter night.

The Railroads Are Ready

It was a knowledge of this spirit and of the extent and character of the railway plant of today that caused John J. Pelley, president of the Association of American Railroads, to say recently in a formal statement that "the railroads are ready to do whatever they may be called upon to do. The railroads will keep themselves ready, ahead of any demand which may come. They will do it under private ownership and operation. They will meet their obligations, firm in the belief that only an America economically strong can continue to be free."

Switch Locks

An Added Precaution Worth Consideration

ONE railway after another is adopting mechanical locks for its switches at points of special hazard, and especially at or near highway crossings where there is the ever-present danger of switch stands being damaged or knocked down, opening the switch under a train and causing an accident many times more serious than the collision of a train and motor vehicle, serious as that in itself may be. A few roads have adopted definite practices in this regard, which call for the installation of such locks on all main-line switches located within a definite distance from important street or highway crossings, usually 500 ft., and this practice is being extended as the higher speeds of both rail and highway traffic increase the hazards at many crossings and the threat to switch mechanisms in the immediate vicinity. In fact, at least one road is now undertaking a general program involving the installation of mechanical locks on all facing-point switches in main-line tracks.

It is a sad commentary on the state of mind of motorists today, if not on their sanity, that, in spite of all of the educational work that has been done in behalf of safety, the large number of grade crossings that have been eliminated, and the protection that has been thrown around at least the more important of those remaining, grade crossing accidents are on the increase, the latest report of the Bureau of Statistics of the Interstate Commerce Commission, for September, 1940, showing that for the first nine months of 1940, there were a total of 2,714 accidents at highway grade crossings, 440 more than occurred in the same period of 1939, with a total of 649 more casualties. Wherever there were facing-point switches in close proximity to any of these accidents, equipped with only normal switch stand locking, there was the potential hazard of the switch stand being knocked down, the switch being opened, and the derailment of the train, with other serious consequences.

Whether there were any such accidents during the

nine months of 1940 for which figures have been given, is not brought out in the statistics available, but that there have been such accidents in the past is well known. In fact, it has been such accidents that have stimulated certain roads to equip their switches with mechanical switch locks, which are designed to prevent the opening of the points, even if the switch stand is knocked down or completely broken off. These roads have found that the relatively small expenditure involved for this added protection is worth-while insurance. Their experience and reasoning in this regard should be of interest to other roads, especially in connection with their switches near those grade crossings which present a special hazard.

Railway Buildings

Should Receive Increased Attention in 1941

IF there is one class of railway property that is more backward than others in service and facilities, it is buildings. As pointed out in an article elsewhere in this issue, this situation exists because the railways are not only far behind in the upkeep of their structures, but are also behind in building alteration, modernization and new construction.

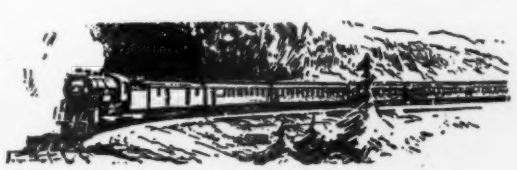
That this situation exists is not the fault of those in responsible charge of buildings on the railways. Neither is it the fault of railway management. It is the result primarily of the prolonged depression in business conditions. When the full force of the depression began to be felt, as early as 1930, through sharply reduced railway revenues, it became evident that both capital expenditures and maintenance costs had to be curtailed drastically. Faced with this situation, retrenchment was instituted which hit practically every railway facility to some extent. Buildings suffered especially because of their limited relationship to safety of train operation, and to overall operating efficiency. As a result, since 1930, annual expenditures for the maintenance of buildings on the Class I railways of the country have averaged less than half what they were in the eight years immediately prior to 1931, which has meant an average yearly reduction in expenditures for building maintenance alone of more than $46,000,000, or nearly $4,000,000 a month.

No one will question that this reduction in expenditures for building maintenance was a necessary and wise decision under the circumstances. That the greatest safety and increased efficiency are still paramount, is also unquestioned; but that a decision made 9 or 10 years ago, which has so orphaned such an important group of railway facilities as buildings, including passenger stations, can continue to hold indefinitely, especially in the light of radically changed operating conditions, increased public demands, and the accelerated deterioration that is taking place in buildings as the result of their continued neglect, is hardly to be expected, and requires review in the light of present conditions.

While building maintenance men on the railways cannot be charged with the responsibility for this situation with regard to their buildings, and have no immediate responsibility for the adverse effects which it is imposing upon railway operation and services, they are the only ones who know the full extent of the deterioration of the structures on their respective roads, and the abnormally rapid rate at which deterioration is progressing as the result of continued neglect, and it is their definite responsibility to bring these facts forcefully to the attention of their managements, to the end that the unfavorable conditions existing can be corrected at the earliest possible date and with the least loss to their properties. With the prospects of larger carloadings in 1941 than in any year since the onset of the depression, with the increased earnings and larger allotments for maintenance which this portends, it is doubly the responsibility of those in charge of buildings to press for increased appropriations for building maintenance, alteration and modernization work during the months immediately ahead. If they do not meet this part of their responsibility it is a certainty that buildings will receive less attention in 1941 than their condition warrants.

Combined with the definite responsibility of railway building men in this regard, they have a second very definite responsibility. Never before in the history of building construction has there been available to building men such a wide range of materials, furnishings, equipment and power tools with which to carry out their work, many of them of recent origin and far superior to the building products available only a few years ago. It is essential that railway building men be thoroughly familiar with these modern products and their relative advantages, and be prepared to adopt those best suited to produce the most effective results in the most expeditious manner, and at the lowest possible costs. That some railway building men are thoroughly familiar with the developments which have taken place in building materials and equipment, in spite of the relatively small opportunity that they have had to make use of them in their own work, is readily acknowledged, but in the interest of refreshing their minds concerning many of these products, and of informing the much larger number of other building men of the developments that have taken place, a large part of this issue is given over to brief descriptions of the newer building products and power tools made by manufacturers who have been long interested in the railway building field.

Railway management is not opposed to the adequate maintenance of its buildings, but with so many other problems and facilities demanding its attention, it is apparent that it must be kept fully informed of the needs of its buildings if they are not to continue to be overlooked. If those in responsible charge of these buildings will fulfill their responsibility in this regard, and will keep informed themselves concerning the many modern materials and power tools that are available to them for carrying out their work, it is certain that, barring a serious upset in the prospects for increased traffic and earnings during 1941, the coming months will witness more building activity on the railways than at any time during the last decade, with more striking and effective results than would have been possible at any earlier time.



Already the Santa Fe Has Approximately 500,000 Nine-Foot Ties in Those Tracks Over Which It Operates Its High-Speed Steam and Diesel-Powered Trains Between Chicago and Los Angeles, Cal.

Why a Longer

The author of this paper, which was presented before the Maintenance of Way Club of Chicago, answers this question most convincingly in reviewing the studies which led the Santa Fe, in 1938, to adopt a 9-ft. tie as standard for tangents and curves in all of its high-speed main tracks between Chicago and Los Angeles. He expects experience to show the increased length highly justified from the standpoints of both economy and increased stability of the track structure

THE only period in the history of the American railroads in which the question of the length of crossties was not involved, was in the early days of their construction, when ties, as we now know them, were unknown and the rails were supported longitudinally on large stones or timbers. Supports normal to the rail, the forerunner of what we now refer to as crossties, were first introduced in railroad construction on a certain road in about 1835, as a temporary expedient, because of the shortage of stone or timber supports. The improvement provided in this type of transverse timber rail support over what had been used previously was recognized at once and ever since then the question of the length of crossties has been before railroad builders.

Why the 8-Ft. Tie?

One of the unanswered questions in railroad track design is how and why the 8-ft. length for ties was adopted in the first place. Claim is made that in the lumber industry it was customary to cut logs into 16-ft. lengths, and that the 8-ft. tie was adopted to avoid waste timber from that length of log. It may well be, however, that the 16-ft. length of logs was based on the length of two 8-ft. ties. For lack of definite information on this point, it may be assumed that the 8-ft. length was merely a matter of judgment on somebody's part. If good judgment was exercised in this instance—namely, in the early days of railroading with their light construction and equipment and slow speeds—it follows naturally that 8-ft. ties are not adequate to meet present-day conditions involving heavy axle loads and high speeds.

Since their first adoption, 8-ft. ties have been strictly adhered to until comparatively recent years, when 8½-ft. ties were adopted by many roads. Originating with Eastern roads, this movement toward a longer tie extended to Southern, Mid-Western and Western roads, until today the 8½-ft. length is a partial standard on 72 roads throughout the country. Canadian roads, according to latest reports, still hold to the 8-ft. tie.

In the progress of railroad transportation, special attention has been given to rail and to the track structure in general; the weight of rail has been increased and the design bettered; all of the various fastenings have been improved, including tie plates, which were unknown in the early days; and ballast has been introduced and improved, and the depth of section has been greatly increased. The notable exception to all of these structural improvements in the track is in the matter of ties. For all practical purposes, there has been little change in their size in the years in which have occurred all of the improvements in the other various items of the track structure to which I have just referred.

For a proper analysis of this subject, Why a Longer Tie?, certain limitations must be introduced. Ties 8 ft. and 8½-ft. long are accepted as standard by railroads throughout the country and, inasmuch as the Santa Fe has adopted 9-ft. ties for certain of its main tracks, this paper will be restricted largely to a discussion of the merits of 9-ft. ties versus 8 and 8½-ft. ties. However, with width so closely related to length, this will be referred to necessarily in some instances.

We started our investigation of larger ties on the Santa Fe in 1922. At that time we adopted 7-in. by 8-in. by 8-ft. ties as standard for main tracks. In 1934 we studied this matter again. In 1935 we went to 7-in. by 8-in. by 8½-ft. ties for curves of one degree and over, and for both curves and tangents in our important main tracks in certain mountainous territories. In November, 1938, we adopted our present standard tie, 7 in. by 9 in. by 9 ft., for tangents and curves in our most important main tracks, and for curves of one degree and more in certain less important main tracks.

In analyzing this question, we realize that one of the problems that would have to be overcome was the reluctance on the part of producers to furnish ties in 9-ft. lengths, irrespective of the additional cost, since we are normally in the 8-ft. tie territory. This reluctance would probably not exist in 8½-ft. tie territories.

As stated previously, we had already had limited experience with 8½-ft. ties, but we were unable to evaluate the economic advantage of this length tie in dollars and cents,

Crosstie?

By F. S. HEWES
Office Engineer
A.T. & S.F. System

A View on the Mojave Gap Line Change of the Santa Fe, in Arizona, Completed in 1940, in Which Nine-Foot Ties Were Used Out-of-Face

over 8-ft. ties. However, from a practical viewpoint, there was no doubt in the minds of our maintenance officers that the benefits to be derived from the 8½-ft. tie would more than compensate for the increased cost. Other than this, we had little information concerning the relative advantages of various tie lengths, so recourse was had to other railroads and to the findings of the American Railway Engineering Association.

Replies from other roads indicated that no direct comparison, either economic or structural, had been made between 8-ft. and 8½-ft. ties. This was for the reason that in making renewals the two lengths had necessarily been mixed together. Furthermore, in locations where out-of-face installations of the 8½-ft. ties had been made, it was not possible to make a comparative test with 8-ft. ties unless a comparable out-of-face installation was made with 8-ft. ties, and this had not been done. One road replied to the effect that the 8½-ft. ties improved track conditions to such an extent that it was not interested in making any comparative tests between the two lengths.

A.R.E.A. Findings

There is considerable information on this subject in the Proceedings of the American Railway Engineering Association, compiled by the Committee on Ties and the Special Committee on Stresses in Railroad Track. The first report of the Tie committee that considered the length of ties, was made in 1905, and in all of its succeeding reports on this subject, arguments were presented for a longer tie. In 1924, the committee recommended that ties should be at least 8½ ft. long, or possibly 9 ft., for heavy-traffic tracks. In 1932 the same committee reported that the subject of the length of ties had been before the International Railway Congress at each of its sessions since 1885, when the first meeting was held in Brussels. Many exhaustive studies and reports have been made by that body, with the conclusion that both theory and experience have demonstrated that long crossties are necessary for modern conditions. The A.R.E.A. Tie committee's report for 1935 states that the committee's investigations over a period of several years disclose that many maintenance of way officers are of the opinion that economies in track maintenance result from the use of ties longer than 8 ft., and that these economies justify the adoption of an 8½-ft. or longer tie.

The Tie committee concluded its 1939 report (submitted after the adoption of the 9-ft. length by the Santa Fe) with the statement that "—an increase in the supporting power of the roadway may be obtained by an increase in the length of ties at less expense than by any other means." It also said in that report: "Considering the additional tie cost, 8½-ft. ties are a better buy than 8-ft. ties and will give added support out of proportion to the added tie cost."

The following is quoted from the Tie committee's report for 1940: "These comparisons point to the fact that, at least as between 8-ft. and 8½-ft. ties, there is little difference in cost once the regional custom or standard has become established. As the advantages of greater length do not stop with 8½-ft. ties, the question may well be asked why a 9-ft. length should not be adopted as standard, at least for heavy-traffic tracks. In the same report, the adoption of the 9-ft. tie by the Santa Fe was mentioned, with the comment that "it is believed that this will result in ultimate economy as well as a stronger track."

Effective Bearing Area

Dr. Talbot, chairman of the Special Committee on Stresses in Railroad Track of the American Railway Engineering Association, who is a recognized authority on the general subject of the track structure, has stated, in part, that to get the best results, the full effective bearing resistance of the tie should extend an equal distance each way from the rail, leaving a space at the middle of the tie not in bearing action and developing but little bearing effect and, therefore, an 8-ft. length is considered too short; perhaps 8 ft. 9 in. would be a desirable length, but 8½ ft. is undoubtedly advantageous.

One of the reports of his special committee indicates that the first four inches at the end of the tie are ineffective as a load support, owing to the fact that the ballast at the end of the tie is not confined. On this basis, assuming an 8-ft. tie and heavy rail, there is about 15 in. of the length outside the rail base, but only 11 in. of effective bearing distance. Therefore, to obtain a balanced support for the rail, only 11 in. should be considered in bearing inside the rail base. However, the practice on the Santa Fe for many years with 8-ft. ties has been to tamp about 15 in. inside of the rail base and out to the ends of the ties.

On the basis of the outer four inches of the tie being ineffective in bearing, there should exist under this condition an unbalanced support for the rail, even though the ties are

tamped an equal distance each side of the rail. However, we have had no complaint from our track forces concerning center-bound track due to this 15-in. tamping distance, which may be due to the rather full ballast shoulder that we use, giving us extra bearing area near the ends of the tie. The practice of tamping 15 in. inside the rail was adopted by the A.R.E.A. Track committee in 1905 and is still its published recommended practice, but a revision is being considered.

There is a question among maintenance men as to the distance of ineffective bearing at the ends of the tie, but if four inches is the correct distance, I am sure you will agree that 11 in. of effective bearing distance on both sides of the rail is not adequate to give it proper support. If this is true, and the tie is not widened or the spacing between ties reduced, the only way left to remedy the condition of insufficient bearing is to increase the tie length. Proper tamping operations impose a restriction on the allowable width of ties and on their spacing in the track.

An 8½-ft. tie will permit an effective bearing distance of 14 in. inside the rail for a balanced support, and a 9-ft. tie will allow 17 in., compared with 11 in. for the 8-ft. tie. This means that a 9-ft. tie will give 43 per cent more effective bearing area than an 8-ft. tie of the same width, which is obtained at an increased cost of about 8 per cent per tie in place. In other words, the increase in effective bearing area pertinent to increase in length alone, compared with the increased cost, is in the ratio of about five to one. This ratio is even more favorable than that of increased stiffness to cost of 131-lb. rail as compared with 112-lb., which is about two to one.

In order to get the full benefit of the increased length of tie alone (no added width being considered here), the number of ties per panel should not be decreased and the spacing between ties should be kept at a minimum consistent with proper tamping. The shorter the span between ties, the less stress there will be in the track structure, especially in rail. For example, considering one of our heavy high-speed passenger locomotives and a maximum permissible bending stress of 30,000 lb. per sq. in. in the rail, the permissible speed on 112-lb. rail with a spacing of 10½ in. between ties, figures 96 m.p.h. If the tie spacing is increased to 15 in., permissible speed is cut to 73 m.p.h. For 131-lb. rail these speeds are 115 and 93 m.p.h., respectively.

Increased Width

In recent years the Santa Fe has been working on a large program of roadbed and track improvement on its high-speed lines between Chicago and Los Angeles, Cal. To get the maximum benefit from these improvements, it was apparent, on the basis of our investigation, that the ties, the renewal of which constitutes the largest single item of expense for material in track maintenance, should keep pace with the other items in the makeup of our track structure.

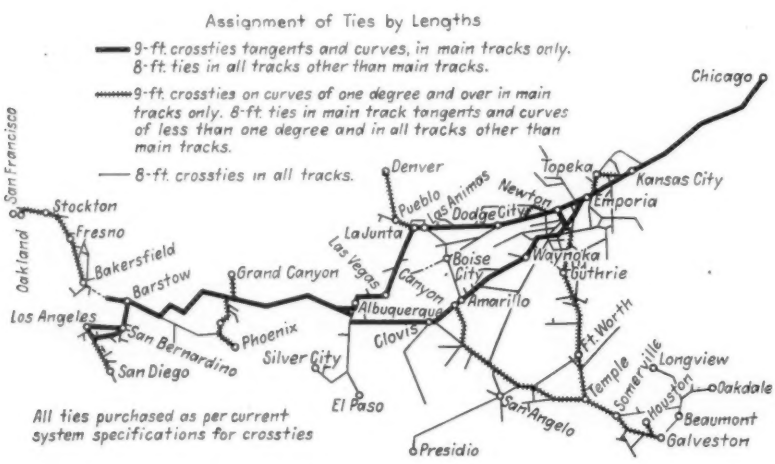
In going to a 9-ft. tie, the Santa Fe, at the same time, increased the width of tie from 8 to 9 in. for sawn ties, so the argument for the adoption of a 9-ft. tie was made in conjunction with the increased width of one inch. Let us now compare the former 7-in. by 8-in. by 8-ft. tie with a 7-in. by 9-in. by 9-ft. tie. Our specifications for hewn ties allow a maximum width of 10 in. for our 8-in. tie. Furthermore, our 8-in. hewn ties usually average about 9 in. in width. Therefore, no change was made in the width of hewn ties. If we were to specify 9-in. hewn ties we would secure some ties 11 in. wide, which we do not want. Our 9-in. sawn ties may go to 10 in. in width.

With the 9-ft. tie, the Santa Fe requires tamping 19 in. inside the rail and out to the tie end—a distance of 45½ in., or 819 sq. in. of tamping area, as compared with 35½ in., or 568 sq. in. of tamping area for an 8-ft. tie. This increase in tamping area amounts to 44 per cent, but due to the wider tie a smaller number will be required per mile. Maintaining a 10½-in. spacing, the increased tamping area on a mile basis amounts to 38 per cent. The increased cost of this 38 per cent, per track mile, amounts to about 11 per cent for ties in place, which is reduced to 9 per cent by the elimination of the extra tie plates and spikes. This ratio is more than four to one.

Any increase in the length of ties involves an increase in the width of ballast section. For a 12-in. depth of section, this amounts to approximately 250 cu. yd. per mile, but I do not believe this increase in ballast should be charged against the longer ties. The added ballast is, in itself, an item of more support for the track structure as a whole.

In changing from an 8-ft. to a 9-ft. tie there are, of course, certain undesirable features which must be considered. As renewals are made, the 9-ft. ties will be mixed in with 8-ft. ties and will extend out six inches on each end beyond the 8-ft. ties. This will give the track a ragged appearance for a few years, but as renewals continue, this will be corrected gradually. Roadway machines, especially ballast cleaners and spreaders, will have to be adjusted to accommodate the increased tie length. To some extent the capacity of treating plants will be reduced as the present cylinders were designed for 8-ft. ties. Furthermore, the tie handling equipment at such plants must be redesigned in some instances.

A tie may be considered as a beam but, due to the many variables in the track structure and the high speed of trains, as well as the different kinds of wood involved, it is not possible to calculate its proper dimensions in the same sense as a structural member is designed. Therefore, the most satisfactory dimensions of a tie constitute a matter that must be left to the judgment and practical experience of the maintenance engineer, with due consideration to the degree of excellence that is desired in the track structure.



Sketch Map of the Santa Fe System, Showing the Assignment of Crossties by Lengths

After considering all these phases of the problem, the Santa Fe, in November, 1938, adopted a 7-in. by 9-in. by 9-ft. tie as standard for tangents and curves in its high-speed main tracks between Chicago and Los Angeles, equivalent to about 4,700 track miles, and for approximately 300 track miles additional in curves of one degree and more in certain of its less important main tracks. Our standard switch ties, beginning with an 8½-ft. length, have been 7 in. by 9 in. for a number of years. For use with the 9-ft. crossties, the length of switch ties has been increased 6 in. With the adoption of the 9-ft. tie, our previous standard 8½-ft. tie has been discontinued, to reduce our standard sizes to the least possible number.

We now have approximately five hundred thousand 7-in. by 9-in. by 9-ft. ties in track, of which a considerable number were inserted out-of-face in line changes and curve reductions. Our limited experience to date indicates that the new standard constitutes a worth-while betterment of our track structure. It appears this improvement will also tend to increase the life of ties, with a resulting sizeable economic benefit.

In conclusion, in my opinion, the Santa Fe's change in tie dimensions was a much needed step in the right direction, and one, the results of which, will highly justify the recommendation of our chief engineer, system, G. W. Harris, and its subsequent approval by our management.

N. & W. and C. & O. Announce Track Awards

CONTINUING their long-standing practice of conducting annual track inspections, the Norfolk & Western and the Chesapeake & Ohio made such inspections in 1940, awarding cash prizes to those foremen whose track showed the highest degree of excellence or the greatest improvement during the year.

Norfolk & Western

The 1940 track inspection of the Norfolk & Western revealed that in that year, the tracks of this company reached the highest state of excellence in the history of the road. For the system as a whole, the condition of the property was rated at 9.38, a gain of three points over the 1939 rating. The rating of 9.50 is the highest that can be given.

Among the five divisions the Scioto division was awarded first place with a rating of 9.43, while the Roanoke terminal, with a rating of 9.41, had the highest score for the terminals. The greatest improvement among the divisions was shown by the Pocahontas division on which the rating increased from 9.35 in 1939 to 9.40 in 1940. First place in this respect among the terminals was taken by the Norfolk terminal on which the rating increased from 9.33 last year to a 1940 figure of 9.39. First place among the roadmasters' district was achieved by the Vera-Cincinnati district of the Scioto division, which attained a rating of 9.45. In the previous year this district, with a rating of 9.43, shared first-place honors with two other districts, namely, the Clinch Valley line of the Pocahontas division and the Greggs Hill-Columbus district of the Scioto division.

As a result of the 1940 inspection, cash prizes for first, second, third and fourth places on the different districts were awarded to 81 track foremen, including 21 first prizes, 24 second prizes, and 18 prizes each for third and fourth places. The highest individual rating among section foremen was achieved by Ernal McCann, Sardinia, Ohio, whose territory attained the perfect mark of 9.50. The second highest rating (9.49) given to a section foreman's territory was attained by W. V. Crosby, Lockbourne, Ohio. The greatest improvement in individual territories in 1940 as compared with the previous year was shown by that of A. J. Epps, section foreman at Halifax, Va., with a rating of 9.09.

Chesapeake & Ohio

Following a practice of many years, the 1940 inspection on the Chesapeake & Ohio was a composite of inspections made during March, July and again late in the fall, these inspections being conducted from a special train, which included a special inspection car containing devices for registering the condition of the track as reflected in the surface, alinement and cross-level.

To make possible the judging of the different territories on a comparable basis, they were divided into five groups according to the character of the track and the class of traffic handled. The groups are as follows: Group 1—double-track main lines, freight and passenger traffic; Group 2—single and double-track main lines, principally freight traffic; Group 3—single track main lines, principally passenger traffic; Group 4—secondary branch lines; and Group 5—yard and terminal territories.

In Groups 1 and 2, prizes of $50, $40 and $30 were awarded to the supervisors in each group receiving the first, second and third highest ratings, respectively, while in Groups 3, 4 and 5 prizes of $50 and $40 were awarded in each group for the first and second highest ratings respectively. Also, a prize of $50 was awarded to each of two supervisors—one in Groups 1 and 2 and the other in Groups 3, 4 and 5—whose territories showed the greatest improvement as compared with the previous year. Cash prizes of $25 and $15 were also awarded to those foremen having the best and second-best maintained sections on each supervisor's territory.

The names of the supervisors who won the prizes in each group are as follows:

Group 1—First prize—J. H. Poindexter, Peninsula district, Richmond division; second prize—H. G. Bowles, Charleston district, Huntington division; third prize—C. E. Butcher, Cincinnati district, Cincinnati division.

Group 2—First prize—J. F. Painter, James River district, Clifton Forge division; second prize—H. S. Chandler, Rivanna district, Richmond division; third prize—O. C. Ewers, Paintsville district, Ashland division.

Group 3—First prize—G. E. Bostic, Mountain district, Clifton Forge division; second prize—C. L. Crummett, Piedmont district, Richmond division.

Group 4—First prize—J. A. Bragg, Cabin Creek district, Huntington division; second prize—G. D. Mayor, Coal River district, Huntington division.

Group 5—First prize—H. S. Talman (assistant division engineer), Russell division; second prize—R. C. Bishop, Maumee district, Hocking division.

The improvement prize for Groups 1 and 2 was awarded to R. Milner, supervisor of the Logan district of the Huntington division, while that for Groups 3, 4 and 5 went to G. D. Mayor, supervisor of the Coal River district of the same division.

Modernize p

More Than 360,000 Structures of 100 Different Types, From Large Office Buildings and Passenger Terminals to Section Tool Houses, Make Up the Building Properties of the Railways, Which Represent an Investment of More Than $1,680,000,000

With 1941 promising greater building activity on the railways than in any year since 1929, to catch up with deferred maintenance, modernize structures, and to provide such additional facilities as are being demanded by changes in operation, this article, with the appended brief descriptions of the newer building materials and power tools available for carrying out this work with the most effective results and the greatest economy, should be of interest to maintenance men generally, and especially to those in charge of building work

THE prospects for a year of heavy traffic and correspondingly better earnings for the railways, combined with the long neglect of their buildings and need for many new structures, presage for 1941 a year of unusually large railway building activity, first, to catch up with deterioration, restoring buildings to good physical condition; second, to modernize and otherwise alter many buildings to adapt them to present operating conditions and to meet public demands; and third, to add such new building facilities as are being required by new methods of operation and new and extended services. In this work railway building men will encounter many difficulties arising from its extent, varied character and widely scattered locations, and from interference by normal building occupancy or use, but at the same time they will find as an aid an almost limitless selection of new and improved building materials and furnishings to achieve maximum utility and modern effects, and an equally large selection of modern building tools that will relieve them of much arduous labor, speed up operations and result in large economies over former hand methods.

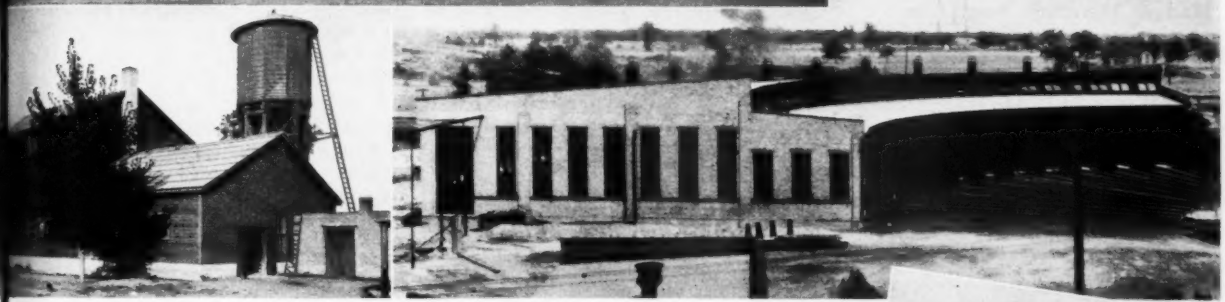
Much Deferred Maintenance

The railways are far behind in their building construction and maintenance work. That this had reached serious proportions by 1939 is indicated clearly in the remarks of the engineer of buildings of a large midwestern railway before the convention of the American Railway Bridge and Building Association in that year, in which he said: "Funds available for building maintenance have been so restricted in recent years that we are confronted with a volume of deferred maintenance of such magnitude as we have never before faced. This is not confined to any one road or group of roads, but is general throughout the country."

At even a much earlier date, railway maintenance officers over the country, confronted with the necessity for giving primary consideration to their more important tracks at the expense of buildings, were readily admitting the same situation on their respective roads. If this situation existed as early as three or four years ago, it is evident that it is still more aggravated today as the result of the continued curtailment in expenditures for buildings during recent years.

That the problem which confronts the railways in repairing and modernizing their buildings is one of considerable magnitude is indicated both by the large number of buildings involved and by their long enforced neglect. In round numbers, there are approximately 360,000 buildings on the railways, including nearly 100 different types and ranging in size and importance from watchmens' shanties and outlying tool houses to large passenger and freight terminal structures. Together, they represent an investment of about $1,680,000,000.

Railway Buildings—With Modern Materials



That this large investment in railway facilities has been neglected seriously during the last decade does not require the testimony of expert railway building men for substantiation. It is evident in even a cursory inspection by one little informed in building matters. However, more conclusive in this regard is the record of the largely reduced expenditures that have been made for building maintenance during the last nine years, as compared with the more normal expenditures made during the eight years immediately prior to the onset of the depression. According to statistics compiled by the Interstate Commerce Commission, the annual average expenditures of the Class I railways for the maintenance of their buildings during the period 1923 to 1930, inclusive, were approximately $86,902,406, whereas during the nine years embracing 1931 to 1939, inclusive, (1939 being the last year for which statistics are available), the yearly expenditures for building maintenance on these roads averaged only $40,621,719, or less than half as much. All classes of buildings have been affected in this drastic program of curtailed maintenance.

Adding to the load now imposed on railway building men as the result of the large backlog of building maintenance and repair work, is the fact that throughout the depression, while maintenance lagged so seriously, needed building additions, and betterment and alteration projects were at a correspondingly low ebb.

Enlarged Programs for 1941

As a whole, therefore, the last decade of reduced capital expenditures for buildings on the railways has been one of change and growth in railway services and activities—which have called for more, rather than less, building activity. That this activity has not taken place has been a serious handicap in the efforts of the railways to improve service, shorten schedules and effect economies, and the continued delay in bringing railway buildings into line with present-day requirements and in keeping pace with further operating changes and demands, can only have a continuing adverse effect on service and efficiency.

Outstanding, in the public eye at least, is the need for extensive passenger station modernization, a need that is causing increasing unfavorable comment, if not criticism, on the part of communities and a large part of the traveling public.

To outline as in the foregoing the situation with regard to the condition of railway buildings implies no criticism of the railways or of their officers. Confronted with drastically curtailed revenues throughout the depression, it became their first obligation and duty to apply such funds as became available for the upkeep of tracks, equipment and other revenue-producing facilities, especially where the element of safety was involved. It was recognized generally that for a reasonable period of time, railway buildings could be neglected with the least adverse effect upon railway safety and efficiency, but with the extension of this period of neglect year after year, there have been an increasing number of railway men who have become deeply concerned

with the condition of their buildings, both structurally and functionally.

With the prospect for railway traffic and earnings in 1941 better than for any year since the beginning of the depression, with the possible exception of 1937, many roads see in the months immediately ahead of them the prospect of being able to give greater attention to their buildings than has been possible at any time during the last decade, and are making definite plans with this prospect in mind. When the railways get into their enlarged programs, it is a certainty that they will find the extent and scope of their work beyond their expectations, because large as are the apparent needs from surface indications, there is certain to be found much hidden deterioration that will have to be taken into consideration.

Modern Materials Available

At the same time, when they get into these programs they will find that since they were last in the market for building materials on any sizable scale, there have been outstanding, if not revolutionary, developments in building materials and furnishings, which will not only permit them to improve their buildings both structurally and architecturally, but to accomplish this with marked economy over the costs that would be involved in the use of former materials and equipment. These improvements, it will be found, affect building construction from roof to foundation—in more attractive, durable and fire-resistive roof and exterior wall coverings; more serviceable and attractive interior wall facings and flooring materials; more sightly and sanitary plumbing facilities; and more appropriate and economical heating, ventilating and lighting equipment. At the same time, there will be found a wide range of materials for insulating buildings against heat losses and for treating walls and ceilings to minimize disturbing noises; materials for the treating of building lumber to prolong its life and to discourage, if not prevent, decay and destruction by termites; many new and improved paint products designed to provide increased protection, maximum durability and various decorative effects; and a generally enlarged line of building specialties, such as doors, sash, skylights and hardware, to meet an increasingly large variety of conditions and service requirements.

Along with these improved building materials and products, there will be found a correspondingly large development in power tools and machines, largely portable in character, and for use with portable power plants where necessary, which are designed to reduce physical effort, speed up production and reduce costs, and in many cases to improve the quality of the work performed. In fact, never before have building men had available to them such a wide variety of materials, furnishings, equipment and tools with which to accomplish maximum results at minimum cost. This is reflected clearly in this and following pages which are given over to brief descriptions of some of the latest developments in the building products of a large number of manufacturers especially interested in the railway field, which are presented in the interest of informing railway building men, or refreshing their minds, regarding what is available to lighten the task which lies ahead of them, and to accomplish the most effective and economical results with the funds that are made available.

Roofing and Siding Materials

THE trend in the development of roofing and siding materials in recent years has been three-fold—towards insulation, beauty and greater permanence. Possibly the development of many insulating, sheathing and roofing materials and the improvements in design and specifications to obtain better insulation with little additional cost, has been the outstanding trend. More recently, interesting modifications of new roofing and siding materials have been developed, emphasizing shadowlines, colors or other effects which add to the beauty of the structure or preserve the original finish of the materials.

In this field, too, as with walls and partitions, the multiplicity of styles, types and colors is almost confusing, for the architect is no longer confined to a few standard materials, but may select for each building a siding or roofing which best suits the purpose of the building, both architecturally and from the standpoints of insulation and permanence.

For purposes of convenience and to avoid confusion, although many of the materials described in this section and in the section on Walls and Partitions are insulating materials, mention of some types of lath and sheathing are included in the section entitled Doors, Windows, Insulation. A few of the recent developments and products available for roofs and sidings, with the above exceptions, are described in the following paragraphs:

Koppers Built-Up Roofs

The Tar and Chemical division of the Koppers Company, Pittsburgh, Pa., through its laboratories and research department, has developed new specifications for built-up roofing for the various types of roof decks which have been developed in recent years. These specifications cover recommended 3, 4 and 5-ply built-up roofs, with or without insulation, over precast gypsum and concrete decks, poured concrete and gypsum roof decks, steel decks and also roof decks with spray ponds and water-cooled roofs. Similar to the other types of Koppers built-up roofs, the principal ingredients are Koppers approved tarred felt and Koppers old-style pitch, which contains coal tar creosote. The specifications include roofs with or without mineral surfacing, bonded for periods of 10, 15 or 20 years if they are applied according to the Koppers specifications by an approved contractor.

Wolmanized Lumber

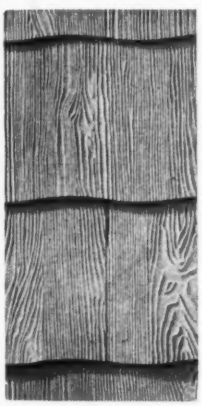
Treated lumber has been used to a much greater extent in recent years, although the building field has lagged in some respects behind the railroads in the use of this type of material. One of the clean treatments suitable for use in ordinary building work is that with Wolman salts, a preservative treatment which is said to make lumber fire-resistant and vermin-proof, including proof against termite attacks.

Two interesting uses of Wolmanized lumber have recently been reported by the American Lumber & Treating Company, Chicago. Early in 1940 the Alton & Southern reconstructed a roundhouse at East St. Louis, Ill., using 83,000 f.b.m of Wolmanized Southern pine, with ring connector construction. Later in the year the Norfolk & Western reconstructed a roundhouse at Roanoke, Va., using 175,000 f.b.m. of Wolmanized lumber in the roof. It is

said that this material was selected for use in these cases because the treatment makes the wood both fire-resistant and less subject to attack from the corrosive engine gases always present in such structures.

Asbestos Cement Siding Shingles with a New Finish

The United States Gypsum Company, Chicago, has developed a new finish process for asbestos-cement siding shingles called Glatex, which produces a permanent mineral glaze baked on and into the shingles at high temperature. It is said that the Glatex finish is unaffected by acids and



The Glatex Asbestos-Cement Siding Shingles Have a Permanent Mineral Glaze

that the shingles can be washed with soap and water to remove oil, grease, soot and other stains. Glatex shingles are available in two designs, wavy edged and clapboard, the former in white, cascade green and silver brown colors and the latter in white alone. The wavy edge design is textured to resemble fine wood graining and the clapboard has a smooth surface.

The U. S. Gypsum Company has also added to its line of asphalt and cement shingles for both roofing and siding, U.S.G. Thick-Butt asphalt shingles, with the extra weight in the exposed portion, and USG Arro-Lock shingle, which has slots at the bottom which hold the shingles tighter than ordinary nailing. Arro-Lock is available in a variety of colors.

Super-Harbord

An exterior grade of plywood has been developed by the Harbor Plywood Corporation, Hoquiam, Wash., named Super-Harbord, which is an addition to the line of other plywood products made by this company. It is available in thicknesses of 3 to 9 plys ($\frac{3}{16}$ to $1\frac{3}{16}$ in.) and can be ordered in a special 11-ply thickness. Super-Harbord is manufactured by a patented process, using a special binder and special treatment, in 1000-ton hydraulic presses followed by a tempering process in closed chambers to make it water-resistant and relatively unaffected by repeated wetting and drying. It is said that the cresylic formaldehyde synthetic resin binder is the vital element of Super-Harbord. This binder is insoluble in water, withstands weathering, is impervious to attack by bacteria and fungi, and is inhibitive to termites, rodents and marine borers. The thermofusing of the plies of veneer with the binder is said to create a bond between the veneers that exceeds the strength of the component parts. Super-Harbord in all grades conforms with the standards of the Douglas Fir Plywood Association.

Waterproof Fir Plywood for Building Exteriors

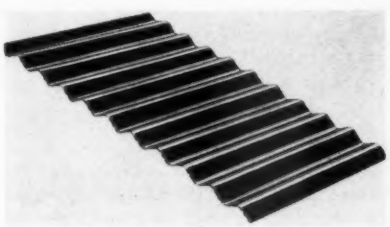
Douglas fir plywood is now being produced in a special grade for exterior use, such as building siding, or wherever a permanently waterproof material is required. It is said that this grade, designated EXT-DFPA, will retain its original form and strength when alternately wet and dry and otherwise subjected to the elements over an indefinite period of time.

The new waterproof grade, like the other grades of plywood, is manufactured from selected veneer sheets, bonded together in cross laminations under hydraulic pressure, but, whereas the other grades employ water-resisting glues in the bonding process, the exterior grade employs the latest development in synthetic resin adhesives, which are said to be unaffected by moisture or water. It is stocked in standard panels 4 ft. wide by 8 ft. long, but can be furnished in special lengths and widths on order. It is made in 3 to 7 plies, with thicknesses ranging from $\frac{1}{4}$ in. to $1\frac{3}{4}$ in., and is furnished ordinarily with one face sanded for exterior exposure.

Through its cross lamination construction and firm bond between plies, the exterior grade plywood has great strength and stiffness and is said to be practically immune against expansion or shrinkage, regardless of temperature and moisture conditions. Like the other grades of plywood, it is readily worked and quickly applied, and in frame wall construction adds materially to the rigidity of the walls.

Vitric Steel Corrugated Sheets

A number of interesting reports of maintenance-free service life have been made for Vitric Steel corrugated sheets, manufactured by the Republic Stamping and Enameling Company, Canton, Ohio,



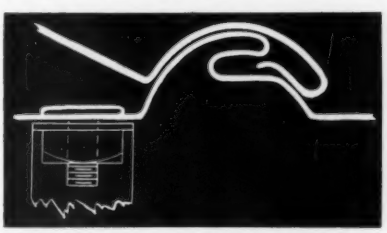
Vitric Steel Corrugated Is Highly Corrosion-Resistant

which have only recenly been placed on the general market. One such report relates to a gate house of the Timken Roller Bearing Company at Canton, on which No. 26 gage black Vitric Steel corrugated roofing was placed with copper nails and lead washers in 1927. A recent inspection after 12 years service with no maintenance cost has shown the roof to be in excellent condition. Another report dealt with a small office building with a Spanish tile type Vitric Steel roof, in which the interior was completely destroyed by fire with no damage to the roof covering. Other industrial applications have been reported with no maintenance costs over periods of 13 years.

Vitric Steel has a corrugated sheet steel base with a vitrified coating of silicates and metallic oxides fused to the metal on both sides and all edges at a temperature of 1650 deg. F. It is said to be completely resistant to the action of fire, fumes, smoke, steam, salt air and other corrosive influences. Laboratory tests are said to have shown it to be practically everlasting, but it was only after the material had been proved in actual service that it was placed on the market. Vitric Steel is available in a wide range of colors, including a light-reflecting surface for the interiors.

Por-Ce-Lok Enameled Roofing and Siding

Porcelain Steels, Inc., Cleveland, Ohio, has developed a patented interlocking design of corrugated roofing and siding sheet,



The Starting Position of the Lock

named Por-Ce-Lok, which is coated on all sides with two coats of special porcelain enamels. The interlocking joint, when the sheets are joined and laid flat, automatically conceals bolt holes and forms a watertight joint with a positive lock and with internal gutters which carry away drainage water and provide a positive barrier against seepage. The sheets are available in stock sizes of 24 in. in width and lengths of 5, 6, 7, 8, 9 and 10 ft. Each sheet covers 24 in. in net width after interlocking and half sheets, 12 in. in width, are provided for starting and finishing the rows to produce staggered end laps.

The sheets are made in a variety of color finishes, including white, blue, maroon, green and brown. The white sheet is said to reflect 70 per cent of the light. Straps, clips, bolts, screws and other accessories, including special flashings for ridges, corners and intersections, are available.

Por-Ce-Lok is recommended particularly for locations where corrosive conditions are severe, and it is said that tests show that its enamel coating is good for a life of 25 years or more in foggy seacoast locations. Another advantage claimed for Por-Ce-Lok is the fact that it does not

require painting or repainting, and that it can be washed with soap and water to restore the original lustre.

Chromated-Zinc-Chloride Treated Lumber

An improvement on the zinc chloride treatment of lumber is the chromated-zinc-chloride treatment developed in recent years by the E. I. Du Pont de Nemours & Company, Wilmington, Del. This treatment fixes the zinc chloride preservative in the lumber more firmly, greatly extending the permanence of the treatment. Various advantages are derived from its use; it combats termites and decay and imparts a definite degree of fire resistance to the wood. Its use is recommended in frame structures especially for foundations, sills and subwalls in areas where there is danger of termite infestation or fungous attack. Lumber treated with chromated-zinc-chloride is clean, dry and odorless and can be painted.

K. & M. Asbestos Corrugated Sheathing

The Keasbey & Mattison Company, Amber, Pa., has developed a corrugated asbestos sheathing composed entirely of asbestos fibers and Portland cement in a strong, dense sheet that is highly resistant to fire and weathering. The sheets are light gray in color and are from 3 ft. to 12 ft. long by 42 in. wide. It is easily cut with a band saw or portable electric saw and can be drilled for nails, drive screws or bolts.

It is said that K & M asbestos corrugated is a very economical roofing or siding for industrial or shop buildings because there is practically no maintenance expense and it becomes tougher and stronger with age. K & M asbestos corrugated is recommended particularly where fireproof construction or resistance to the corrosive action of smoke and fumes is needed.

Barrett Shingles

Two of the latest additions to the line of roofing products manufactured by the Barrett Company, New York, are Dublecote Multi-strip shingles and Broad Shadow shingles. The Broad Shadow shingles are a two-butt strip shingle with a distinctive design which produces very heavy shadow lines that add greatly to the beauty of the roof. They are available in various sizes, weights and colors.

The Dublecote Multi-strip shingles are double asphalt-coated and double mineral-surfaced where the wear is greatest. They are said to provide longer life, deeper shadows, double weather protection and greater fire resistance. They are available in a standard weight of 210 lb. per square or a massive weight of 240 lb. per square and in various color blends.

Ruberoid Vitramic Asbestos Siding Shingles

The Ruberoid Company, New York, has developed a vitramic asbestos-cement siding shingle with a new type of surface baked on at high temperature, producing a harder, denser finish which repels water and resists dirt. The surface of this shingle is said to be so hard that it cannot be scratched with a knife. It requires no paint or stain and is easily cleaned. The new finish is said to be extremely white and the shingles have an appearance like thatched wood shingles painted white.

New Mule-Hide Shingle

A recent addition to the Mule-Hide roofing products of the Lehon Company, Chicago, is the Mule-Hide Cor-Du-Roy Super Nu-Square Tab, a new design in square butt asphalt shingles of heavy weight. This new shingle weighs approximately 210 lb. per square. The tabs are cut in such a way that when the shingles are applied they form a pattern of perfect squares. Mechanical advantages of the Cor-Du-Roy texture are that its alternate ribs and grooves prevent "side drift" and serve as expansion joints, which allow the shingle to expand and contract easily with extreme changes in temperature. This shingle measures 12 in. by 36 in., with 100 strips to a square. Four colors are available.

Careystone Tri-Tone Strip Shingle

A recent addition to the extensive line of roll roofing and shingle roofing and siding manufactured by the Philip Carey Company, Lockland, Cincinnati, Ohio, is the Careystone Tri-Tone, a new asbestos-cement strip shingle which automatically, because of its staggered edge and varying tones, gives an individual shingle effect and when laid, provides an attractive blend of color tones, without bunching or patterning. The shingle panels are 12 in. by 24 in. in size and are laid with a 9-in. exposure, a 3-in. head lap and a 4-in. side lap, requiring two nails and one anchor per piece.

Floor and Platform Materials

THE problem of maintaining floors and platforms under heavy traffic, particularly under heavy trucking, has long been a particularly troublesome problem for railway officers responsible for building maintenance. This problem has been alleviated to a great extent by the development of patching and resurfacing compounds that have been developed within recent years for various types of floors and surfaces. These products, many of which will stand up under very heavy traffic, are also used in new construction to secure longer life with greatly reduced maintenance costs, and non-slip safety features.

Other products, based on developments of the chemical and dye industries, have revolutionized the finishing of concrete, particularly for interiors, with the result that attractive colors in keeping with modernization and streamlining are now possible at reasonable expense. Some of the most recent developments in flooring and platform materials and in concrete treatment that are of special interest to railroad building men in meeting their problems are described in the following paragraphs.

Color Finishing Concrete Floors

The Master Builders Company, Cleveland, Ohio, has developed two methods of color-finishing concrete floors, both of which produce smooth, non-slip surfaces. One method uses Glazecoat, a product based on recent developments in the field of synthetic resins. In applying this compound, floors are first thoroughly cleaned and, if necessary, washed with tri-sodium phosphate. The floor is then acid-etched with a 10 per cent solution of muriatic acid, rinsed and allowed to dry, after which Glazecoat stain is applied with a scrub brush and allowed 15 to 30 min. to dry. Glazecoat finish is then applied with a soft brush, allowed to dry and polished. It is said that floors finished in this manner have a durability under traffic wear four to six times as great as painted floors. Glazecoat is available in 13 colors.

Another method of color-finishing concrete floors is the Colormix-KuroKrome process. Colormix is a fine, dry powder

with intense dyeing power, which is mixed with the concrete in the proportions specified. As soon as the fresh colored concrete has hardened, the KuroKrome finish coating in liquid form is applied and covered with ordinary building paper until it has set. It is said that the KuroKrome coating eliminates any chance for salts or efflorescence to mar the color, dyes out any imperfections or non-uniformity of color and prevents absorption of stains. Colormix and KuroKrome are available in eleven shades.

Rock-Tred and Tred-Seal

The Rock-Tred Company, Inc., Chicago, has developed Rock-Tred, a pre-mixed floor resurfacer for concrete and other rigid-type floors, and Tred-Seal a non-slip floor protection for wood, concrete or metal floors. Rock-Tred is a highly cohesive pre-mixed compound sold with the primer and drier included and is easily applied. It is said to set hard enough for walking in 8 to 12 hours and for heavy loads in 16 hours. After initial compression, it is virtually unaffected by heavy loads. It is sparkless, non-dusting, waterproof, non-slip, fire-resistant, resilient and vermin-proof. Tests of Rock-Tred by the Pittsburgh Testing Laboratory, Pittsburgh, Pa., with a sample ⅜ in. thick which had set for 16 hours, showed an indentation of 1/64 in. under a load of 278 lb. per sq. in. and no further indentation when the load was doubled. Tests also showed the material to be spark-proof.

Tred-Seal is a pre-mixed dark brown product of a rubberized nature and is applied in a thin film. It dries to the touch in one-half hour to an hour and after a short setting period will stand up under considerable wear and foot traffic. It may be applied on wood, concrete or metal floors. On wood floors it seals, preserves, waterproofs and splint-proofs the floor. On concrete it seals, waterproofs and is non-dusting. Tred-Seal should not be applied to floors subject to oils, greases, acids or other materials that will injure rubber.

Flexrock Products

The Flexrock Company, Philadelphia, Pa., has improved two of its products, Ruggedwear Resurfacer and Glasflex, a floor finish. Ruggedwear Resurfacer, a floor covering and patching material, has been improved by the addition of chrysotile, a fibrous rock, which replaces the asbestos fiber formerly used. It is said that

Applying Ruggedwear Resurfacer

chrysotile fibers are resistant to all ordinary acids, are twice as strong as asbestos fibers, are waterproof, and will not rot or disintegrate. For these reasons it is claimed that the improved Ruggedwear Resurfacer makes a tougher floor surface than heretofore and that it produces a tougher feather edge when it is used for patching work.

The Glasflex floor finish is now said to be completely resistant to acids, alkalis and fire. This product, which is adaptable for use on wood and concrete floors, counters, table tops and similar locations, has heretofore been known to be resistant to minor acids and heat, although before being improved it was affected by extreme alkalinity and acidity.

Carey Elastite Asphalt Tile

The Philip Carey Manufacturing Company, Lockland, Cincinnati, Ohio, has developed an improved asphalt tile named Elastite, which is said to have a smoother and more attractive surface and to possess a number of advantages as an industrial flooring and also as a roofing. Elastite is a compound of asphalt and mineral filler reinforced with asbestos fibers and die-cut to size. It is manufactured in standard black and red colors, with a thickness of ½ in., and in sizes of 12-in. by 12-in. or 12-in. by 24-in. It has a high resistance to fire, having a flash point of approximately 700 deg. F., and an electrical insulating value approximately equal to that of marble, with a breakdown voltage of more than 30,000 volts. It is vermin and rot-proof and practically non-absorbent in the presence of water. It has been approved by the Underwriters Laboratories for Class A built-up roofing, when applied in accordance with their instructions on slopes up to and including 1 in. to the horizontal foot. Elastite is said to be extremely dense, tough, highly resistant to compressive loads, dustless and quiet under wheel traffic. It may be applied to any properly prepared subbase and is ready for use as soon as laid.

Heating, Plumbing and Ventilating

ONE of the trends in heating equipment has been the streamlining of such equipment, enclosing it in attractive insulated casings. Such units have also been improved in efficiency and a large variety of new heating equipment, with oil and gas burners, has been designed and placed on the market. The recent trend toward air conditioning has also been an important factor in heating and ventilating design and many heating systems today are designed with fan systems to provide air cooling, if not air conditioning, in the warm summer months.

In the plumbing field, many lines of toilet fixtures have also been streamlined and are available in various colors. Standard plumbing valves, fittings and connections have been improved and products in this line have been developed that will give long life with trouble-free service. Some of the more recent developments of various companies in the heating, plumbing and ventilating field are described below:

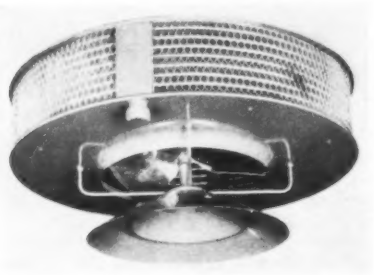
New Sturtevant Heaters

The B. F. Sturtevant Company, Inc., Boston, Mass., has added two types to its line of heating and ventilating equipment, a line of multivane heaters and downblast unit heaters.

The multivane heater consists of a large enclosed unit with a heating element or radiator and a series of slow-speed Sturtevant multivane fans mounted on a single shaft, which blow the heated air through large outlets into the room. The unit may be controlled manually or automatically and temperature control is obtained by shutting off the blower motor or regulating a by-pass feature in the heater. The Multivane heater delivers a large volume of air at low final temperatures and is designed for heavy duty heating. It is available in various sizes and capacities suitable for mounting on the floor, wall or ceiling. The heater may be equipped with a motor support and drive at either end.

The downblast speed heater is a vertical projection-type unit heater, consisting of a cylindrical Sturtevant extended surface coil with an electric motor and a three-bladed aluminum propeller fan mounted in the center. The air is drawn through the coil and forced downward by the fan. Removable cones allow a concentrated or diffused air stream as desired. A resilient mounting is provided for the motor, which allows the motor to oscillate on its axis, reducing vibration and motor hum. The coil or heating element is said to be unusually rugged and is guaranteed to withstand pressures up to 200 lb. per sq. in. Headers are provided on

both sides of the coil to permit condensate to be cleared rapidly, even at low pressures. This construction also insures equal temperatures and expansion throughout the entire surface. Twelve sizes of downblast heaters are built, varying from the D40 with

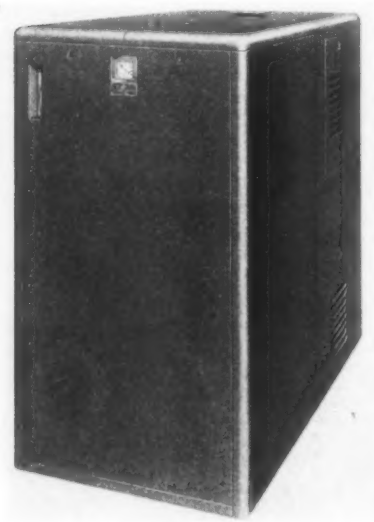


A Sturtevant Downblast Speed Heater

a ⅛ hp. motor and capacities ranging from 37,200 to 82,900 B.T.U. per hour to the D400 with a ¾ hp. motor and capacities ranging from 372,000 to 827,000 B.T.U. per hour, depending upon the entering air temperature and steam pressure.

Ideal Oil Burning Boilers

Recently developed products of the American Radiator & Standard Sanitary Corporation, Pittsburgh, Pa., include the No. 6 and No. 8 Ideal oil-burning boilers for heating



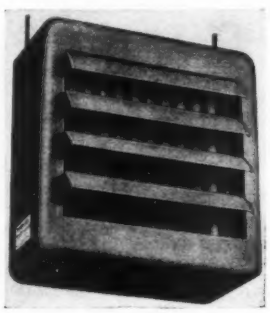
A No. 8 Ideal Boiler

small buildings with steam or hot water radiation. The No. 6 Ideal boiler comes in one size, with a capacity for 375 sq. ft. of steam radiation or 600 sq. ft. of hot water radiation (net installed radiation). The No. 8 Ideal boiler can be ordered in various sizes from 390 sq. ft. of steam radiation or 625 sq. ft. of hot water radiation up to 810 sq. ft. of steam radiation or 1,295 sq. ft. of hot water radiation.

Both types of boilers are cased in attractive insulated steel cases with rounded corners and green baked enamel exterior finish. When specified, they can be ordered equipped with Taco internal water heaters for domestic hot water the year around. The boilers have finned flue surfaces to absorb the maximum amount of heat from the hot gases and the fire box is designed to provide clean, complete combustion of the oil and a quick heating response. The front panel is equipped with a Pyrex sight glass for observing the flame, a pressure vacuum gauge on steam boilers, and an altitude gauge and thermometer on hot water boilers. Proper ventilation for the burner and controls is furnished by grilles in the rear.

Murco Unit Heaters

The D. J. Murray Manufacturing Company, Wausau, Wis., has developed a line of vertical projection type unit heaters and heaters in modern streamlined cabinets under the trade name "M Series Murco," which are an addition to the line of unit heaters previously manufactured. The M Series Murco unit heaters are made with all-copper and bronze heating elements, with



A' Cabinet Model M Series Murco Unit Heater

few brazed joints. The copper fins are metallically bonded to the copper tubes, with an effective permanent bond that is said to maintain contact, even at high temperatures. The spiral design of the individual copper tube cores and fins is said to provide an even distribution of heated air at high velocity. The individual tubes prevent stresses due to unequal expansion. In the cabinet models, the entire heating unit is spring suspended and floats free in the casing, thus eliminating rigid connections between the cabinet and the unit. The vertical projection heaters are made in 11 models. The cabinet heaters are made in 27 models for steam, and 8 models for hot water. Each cabinet is finished with an attractive baked crinkle enamel finish.

Crane Conservoil Heating Unit

The Crane Company, Chicago, has introduced a Conservoil Heating Unit that is designed especially for small building heating requirements and offers efficient automatic heat on a very reasonable basis. The burner, which is furnished with the Unit, is mounted on a flange at the front of the boiler. The boiler is compact in size and is provided with controls which give full automatic heating and assure maximum efficiency from intermittent firing. These controls include a room thermostat, a boiler limit control (pressure or temperature) and

New Crane Conservoil Heating Unit

flame control or stack switch. The furnace is also equipped with a 66-gal. trombone-type coil heater, which insures a constant supply of hot water automatically.

Walseal Silbraz Joints

One of the newest developments of the Walworth Company, Inc., New York, is the Walseal Silbraz joint, a method of sealing threadless brass and copper pipe joints or copper tubing joints in construction where long life and freedom from maintenance of piping are necessary. The Walseal Silbraz joint is specially machined with a small circular keyway in the inside diameter of the end of the fitting. The fittings are made with a slight amount of clearance between the outside diameter of the end of the pipe and the inside diameter of the fitting.

The joint is assembled with a ring of Sil-Fos (brazing alloy) placed in the keyway in the fitting and oxy-acetylene torches are

Part Cut-Away View of a Walseal Silbraz Joint With Sil-Fos Ring in Place

used to seal the joint as follows: First the pipe is heated next to the joint to a slightly black color, causing it so swell and fit tightly in the fitting. Then the end of the fitting is heated, causing the fitting to expand and

the Sil-Fos brazing alloy to melt and run out of the keyway, completely filling the small space or clearance between the fitting and the pipe. When a continuous silver-colored band or fillet of Sil-Fos 1/32-in. wide or wider shows in the clearance area between the pipe and the fitting at the end of the fitting around the entire circumference of the pipe, the joint is completely sealed. The heating is done with the torches in such a manner that a squeezing action takes place during the heating and cooling, forcing the alloy into the joint area. Walseal joints are said to be able to withstand severe tests without failure.

G-E Oil Furnaces

The General Electric Company, Division 111, Bloomfield, N. J., through its research department, has developed a complete line of oil and gas furnaces, winter air conditioners for warm air heated buildings and air conditioned equipment for buildings or units for individual rooms. The G-E oil furnace, which was introduced several years ago, is the result of five years of research and tests. Its operation is based on a method of oil atomization called impact-expansion atomization and a new design of furnace, in which the atomized oil and air are injected downward into the combustion chamber from the top, and a secondary supply of air for combustion is introduced from the bottom.

Paints and Painting Equipment

DEVELOPMENTS in the field of chemistry have had a very marked influence on the improvement of paints, varnishes, lacquers and similar coatings. With the availability of new solvents, many specialized vehicles have been developed for paint pigments which have greatly improved the durability of paint, and the ease of application. As a consequence, paints have become highly specialized and the manufacturers have developed specific paints to meet every variety of condition, both as regards the medium to be covered and as regards the type of exposure and other conditions. In addition, a wide variety of new pigments are now available, and the colors and quality of practically all paints have been improved.

In the field of equipment, spray painting, sand blasting, and power cleaning and brushing equipment have been developed, with a wide range of related accessories, greatly reducing the cost of painting in many cases. Some of the recent developments or improvements in paint and painting equipment are described below:

Aluminum Paint

The Aluminum Company of America, Pittsburgh, Pa., has continually engaged in extensive research on the development of and the use of aluminum paints, which are now available for painting almost any type of surface. They are adapted particularly for the protective coating of steel and other metals and can be also used as a priming coat and a finishing coat on wood. They are recommended as a priming coat for wood exteriors which are to receive a finish coat of white paint. The use of aluminum paint for this purpose is said to add considerably to the life of the paint and to have a preservative effect on the wood. They may also be used for interior painting as a primer coat to hide stains, bleeding and knots in wood, and as the finish coat in interiors where the light-reflecting properties help considerably to brighten up a room or shop.

Direct-Drive Spray Painting Outfit

The DeVilbiss Company, Toledo, Ohio, has added to its extensive line of spray painting equipment and accessories, a new direct-drive spray painting outfit to serve the field where medium and small, light-duty units are required. Known as Type NCK, the unit is operated by a 1/3 hp. electric motor, direct-connected to a piston-type single cylinder compressor which has a displacement of 4.58 cu. ft. of air per min. and is mounted on a metal base equipped with rubber feet. The cylinder has a bore of 2 in. and a piston stroke of 1½ in. Maximum working pressure is listed as 40 lb. per sq. in.

A fan-type counter-balanced fly-wheel is used to minimize vibration and provide cooling. The finned air chamber relieves pulsation and serves as an oil and moisture separator. The unit is provided with a safety valve, drain valve, connection for hose and a 12-ft. electric cord with attachment plug, while a switch at the motor contributes to convenient operation from an electric outlet.

Type NCK Paint Spraying Outfit

Stationhide Paint

The Pittsburgh Plate Glass Company, Pittsburgh, Pa., has recently developed Stationhide, an exterior building paint, that is designed specifically for the railroads, to provide protection for long-neglected exterior wood surfaces with as few coats of paint as possible and also improve the color uniformity of the job directly after painting. To do this, a paint was developed which had controlled penetration. The oil in Stationhide is said to remain with the pigment, penetrating into the surface only enough to provide proper bond and adhesion of the dried paint coats. Stationhide may be applied with a brush or sprayed and it is said to have improved drying qualities, a uniform glossy appearance which will endure for a long period, resistance to dirt accumulation, spotting and discoloration, and to be washable.

Kem-Save-Lite

The Sherwin-Williams Company, Cleveland, Ohio, has just produced a new synthetic mill white called Kem-Save-Lite, which is said to cover with one coat and dry overnight to a hard tile-like surface. The new finish is available in gloss, eggshell and flat hues and is sold as a companion to the company's regular Save-Lite white. It is recommended for conditions which require maximum durability, faster drying and extremely sanitary washable surfaces. Kem-Save-Lite combines a new synthetic vehicle with improved pigments, and is said to reflect and diffuse as much as 89 per cent of the light and to remain white longer than previous mill whites. It applies easily as an oil paint and is said to have exceptional resistance to moisture and cleaning. One coat is sufficient on average surfaces.

Improvements in Dutch Boy White Lead

The National Lead Company, New York, has introduced certain refinements in the manufacture of its Dutch Boy white lead

that have resulted in increased whiteness and improved hiding power. It is said that, when examined in a photometer, the improved white lead will reflect approximately 90 per cent of white light as compared with 81 per cent for the commercial product of a few years ago. Formerly a gallon of pure white lead paint, consisting of equal parts of white-lead paste and linseed oil, would obscure about 170 sq. ft. of black surface, whereas it is said that today a gallon of the improved paint formulated on the same basis will hide about 210 sq. ft., an increase of slightly more than 23 per cent. In addition, it is said that the refinements in manufacture have also resulted in an increase in the so-called "bodying" or paint-thickening properties of Dutch Boy white lead. It is claimed that the better body makes it possible to add the amount of linseed oil needed to obtain the desired result and still get a full-bodied paint that brushes out smoothly without running or sagging.

Dixon Paints

The Joseph Dixon Crucible Company, Jersey City, N.J., has developed its flake silica graphite paint especially for use where corrosive conditions exist, taking advantage of the fact that flake graphite is chemically inert and is, therefore, unaffected by acids or alkalis. Natural flake graphite as a paint pigment, however, needs something to give it tooth and brushing property and silica is added, producing a pigment with inertness and low specific gravity. This paint, when applied to a surface, is said to form an admirable protective coating, with the flat flakes of the pigment overlapping like the scales of a fish. It is said to be non-reactive to fumes, acids, cold, heat or the actinic rays of the sun and to have the unique property of water repellency.

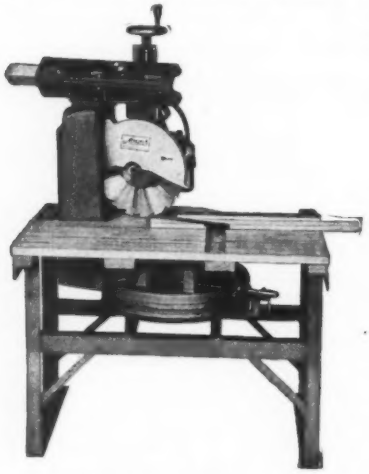
Power Tools and Equipment

ONE of the most outstanding developments in the building industry during the last few years has been the development of many new and efficient tools; especially noteworthy has been the development of portable tools and portable power units. Until recently the use of power equipment has been limited largely to the larger jobs but with the wide variety of small portable tools and accessories and portable power units now available, many operations formerly performed by hand can now be done, even on small jobs, with the aid of such equipment, quickly, more accurately and often with a considerable saving in costs.

Such equipment includes power saws, drills, hammers, grinders, groovers, planes, sanders, concrete vibrators, power units and various accessories for specific jobs such as dadoing, rabbetting, routing and tenoning in wood work and finishing and brushing concrete surfaces. In the following paragraphs a number of the more recent developments in equipment and tools of interest to railway building men are described:

Uni-Point Radial Saws

The American Saw Mill Machinery Company, Hackettstown, N. J., has added a Uni-Point radial saw to its line of woodworking machinery which uses a counterbalanced tilting column to pivot the saw both horizontally and vertically about one point in the center of the table. The saws are made in two models, a Senior model with a ball bearing roller table and a cut-off capacity of 5 in. by 20 in. and a portable or table-mounted Junior model with a cut-off capacity of 3 in. by 15 in.



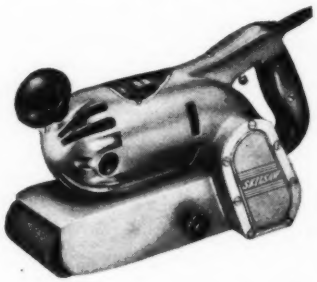
A Table-Mounted Junior Model Uni-Point Radial Saw

It is said the new machines will perform any kind of sawing job. Rapid adjustments for any angle are possible and the saw always enters the cut at the same position on the table so that an accurate fixed gage and cut-off stops may be used to facilitate fast, accurate cutting. The telescoping over arm brings the saw out in the clear with no projecting parts to strike the operator's head or shoulder and the entire work table is free of obstructions when the saw is pushed back. Accessories are available with the saw for such other operations as dadoing, rabbetting, routing, tenoning and shaping.

New Portable Electric Belt Sander and Saw

Skilsaw, Inc., Chicago, has recently added two new products to its line of portable electric tools; a portable belt sander named the Zephyrplane Junior and a 6-in. portable electric saw, known as Model 67. The Zephyrplane Junior is a 9½-lb., 2¼-in. belt sander with a die-cast aluminum frame, ball-bearing construction, a powerful universal motor, a bakelite handle, a trigger-type momentary switch and a patented "touch-control" lever which permits quick changing of belts. The belt travels at a surface speed of 600 ft. per minute. A variety of belts are obtainable for use on wood and metal, for removing varnish and for polishing.

The Model 67 electric saw is designed for heavy-duty service. It cuts to a depth of 1⅞ in. and will rip and cross-cut hard wood up to 1 in.; cross-cut dressed pine lumber up to 2 in.; and bevel-cut lumber 1 $\frac{3}{16}$ in. thick at an angle of 45 deg. The blade has a free speed of 3400 r.p.m. and is protected by an automatic telescopic guard that rotates on ball bearings. It may also be used with abrasive discs for scoring tile, concrete, etc., and for tuck-pointing.



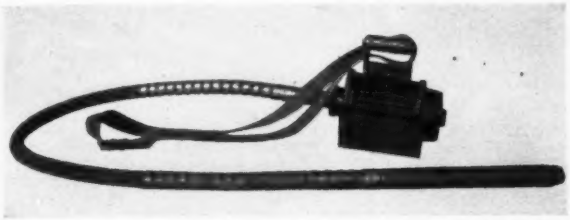
The Zephyrplane Junior Belt Sander

Syntron Portable Tools

The latest in the line of portable saws, concrete vibrators and electric hammers manufactured by the Syntron Company, Homer City, Pa., is a high-speed, electric motor-driven concrete vibrator, which employs a 110-volt universal motor as the driving medium. The motor weighs approximately 25 lb. and is fitted with a shoulder strap and soft rubber pad so that it can be carried by the operator. The vibrating head is 1⅝ in. in diameter, 18 in. long and vi-

brates at a speed of from 9,000 to 10,000 r.p.m. Six-, four- and 12-ft. lengths of flexible shaft connect the motor with the vibrator head and the motor is equipped with a 40-ft. electric cord fitted with a ground wire.

The Sytron Company has also developed the No. 25 electric hammer which is designed primarily for the heavy drilling of holes up to 2 in. in diameter, and for cutting work in concrete, masonry, brick, etc. The No. 25 is built with two electro-magnets wound around a barrel in which a free-moving piston strikes directly on the shank of the tool being used. It is 16 in. long overall, and weighs only 25 lb. A blower motor in the handle keeps the magnet windings cool.

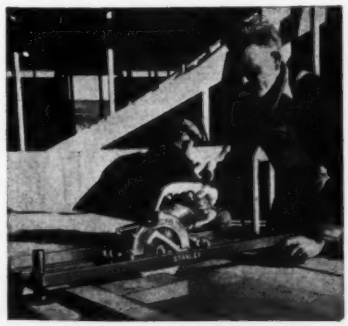


The New Concrete Vibrator and Motor

Stanley Saw Frame and New Portable Saw

The Stanley Electric Tool Division of the Stanley Works, New Britain, Conn., has developed a new saw frame, No. 158, and a new portable electric saw, No. W7. The No. 158 saw frame is made of structural steel and is readily adjustable for use with the Stanley safety saws Nos. W-7, W-8 and W-9. It is adjustable for height from minimum to maximum capacity of the saw by moving clamp nuts on each end, while a stop pin in front drops into bored holes in the bench for adjustment for cutting at any angle other than straight cuts. The frame is designed to eliminate the laying out and marking of each piece of lumber and to save time in cutting lumber to exact sizes.

The Stanley W7 Portable Electric Saw



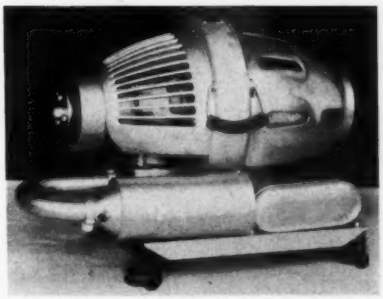
Stanley No. 158 Saw Frame

The Stanley W7 saw has a cutting capacity of 2½ in. and a blade speed of 3700 r.p.m. It is provided with a new design Duplex handle which has two gripping positions and two triggers which can be operated independently. Safety guards keep the blade covered at all times. Its motor is a universal type for a.c. or d.c. current.

Portable Generator

The Homelite Corporation, Port Chester, N. Y., has placed a new generator, Model SHR, on the market, which has a capacity of 2,000 watts and is designed to fill the need for a medium-capacity, highly portable generator for the operation of portable electrical work equipment. The Model SHR is unusually compact, with the gasoline-engine motor and gasoline tank neatly mounted on a small spring-supported platform under the generator unit. The entire generator outfit weighs only 90 lbs.

This company has also recently developed a twin-cylinder portable generator of similar construction weighing 130 lbs., with a capacity of 3,000 watts.



The Model SHR Homelite Generator

New Mall Saw and Plane

The Mall Tool Company, Chicago, has added a 12-in. pneumatic circular saw, model P-120, and a door-type electric plane to its line of portable and power-operated tools, which are adapted to many types of railroad building and preframing work. The P-120 weighs 29 lb. and has a free speed of 1,400 r.p.m. It is operated by compressed air at 90 lb. pressure by an air motor which, at that pressure, has 2.7 hp. and consumes 70 cu. ft. of air per minute. The saw has a cutting capacity of 4⅝ in., with adjustment to control the depth of cut. A swivel base permits cutting at any angle up to 45 deg. The exhaust air of the motor is utilized to keep the cutting line and observation glass clear. The saw is equipped with the Mall telescopic safety guard which gives complete protection to the operator at all times.

The Mallplane is a power door plane weighing only 11 lb., which planes any surface up to 2 1/16 in. wide to any depth up to ⅛ in. It is equipped with a spiral type cutter which is said to be under the control of the operator at all times and can be raised or lowered while cutting. The plane is powered with a 110-volt or 220-volt Universal type motor and is equipped with an adjustable bevel fence, allowing any angle of bevel to be cut. It has a two-hand grip and is said to plane any kind of wood across or with the grain, leaving a finished surface that does not require scraping or sanding. Each plane is furnished with an attachment for sharpening the high-speed spiral cutter.

The P-120 Pneumatic Circular Saw

Wood-Working Machines

The DeWalt Products Corporation, Lancaster, Pa., manufactures a complete line of five types of wood-working machines for heavy duty sawing and woodworking, con-

The Type GP DeLuxe Table Model

sisting of 72 distinct models with 11 different frames, varying in size and power from ½ hp. up to 15 hp. The machines consist of a rigid work table supporting a column, which in turn supports a cantilever arm from which the universal electric motor and radial saw are suspended by means of an adjustable motor yoke. The arm, column and yoke are made of cast nickel-molydbenum steel. Each machine has three 360 deg. adjustments; the cantilever arm rotates on a horizontal plane around the column. The motor yoke rotates horizontally under the arm and the motor rotates on a vertical plane in the yoke.

The smallest model of these machines, the type GS, is equipped with a ½-hp. direct-drive motor and may be equipped with an 8-in. or 9-in. saw, which will cut a maximum depth of 1⅞ in. or 2⅞ in. respectively. The next size, the type GP, may be equipped with a 1½, 2 or 3 hp. motor and with saws ranging from 8 to 14 in. in diameter, with a cutting depth of 1⅛ in. to 4⅛ in. Both type GS and type GP are available with portable mountings. The other machines range up to 15 hp. with a maximum cutting depth of 17⅜ in.

Improvements in Do-All Electric Hammer and Drill

The Wodack Electric Tool Corporation, Chicago, has made several improvements in its portable electric tools during the last year and especially in its Do-All combination electric hammer and drill. The Do-All operates from either a.c. or d.c. current and drives star drills at the rate of 2,400 blows per minute to any depth up to 24 in., drilling holes up to 1⅜ in. in diameter. It can also be used to drive chisels, bullpoints, vibrators and other tools for working on concrete. With the hammer member removed, the Do-All becomes a heavy-duty ⅜-in. electric drill with a Jacobs chuck.

The latest improvements in this tool consist of the construction of the plunger by the drop forging process to give longer life to the working parts of the hammer; a newly

The Wodack Do-All Combination Electric Hammer and Drill

patented process of winding the armature, practically eliminating shorts; and an all-rubber tool retainer that keeps star drills and other tools from falling from the hammer when in use.

Interior Walls and Partitions

ONE of the most outstanding developments in the building industry in recent years has been the perfection of many new types of insulating and sound-proofing boards, wall boards and plywoods, adapted for use in almost any type of building and providing almost any type of interior finish and architectural effect that may be desired.

A wide range in types of these boards is now available, some of which are grooved for special finish effects. These boards may be painted or are available in special color finishes; extensive lines of metal and wood trims or special nailing strips are also made for a variety of decorative effects. The designer is no longer limited to a few standard types of interior finishing materials, but may now select a specialized material that will satisfy almost any requirement.

Some of the most recent or outstanding developments in this field are described in the following paragraphs:

New Asbestos Cement Wallboard

The Philip Carey Company, Lockland, Cincinnati, Ohio, has recently perfected a new product, Careystone asbestos-cement wallboard, the outstanding feature of which is its workability. It is said that it may be nailed, sawed, hammered and perforated without danger of cracking or splitting and that it is unusually flexible, making it possible to curve it to a four-foot radius without breaking. Being made of asbestos fiber and Portland cement, Careystone is highly fire-resistant and can be used for fire stops. It is also said to be unaffected by termites. It may be painted and repainted, is available scored in 4-in. by 4-in. squares to represent tile, and is manufactured in thicknesses of ⅛ in., ¼ in., and ⅜ in., and in sizes of 48 in. by 48 in. and 48 in. by 96 in.

Upson Giant Panels

The Upson Company, Lockport, N. Y., has made available panels of its Upson Strong-Bilt panels, in sizes 8 ft. wide by 14 ft. long as well as in panels 4 ft. wide and 6, 7, 8, 9, 10, 12, 14 and 16 ft. long. This company has also developed a floating fastener for Strong-Bilt panels, the use of which eliminates exposed face nailing and is said to offset normal structural movements and expansion and contraction by permitting the panel to float up or down or from side to side. The fasteners are nailed

Using Floating Fasteners for Applying Upson Strong-Bilt Panels

to the studs, joints or furring, 12 in. apart on ceilings and 14 in. apart on walls. To clinch the panels to the fasteners, a 2-in. by 4-in. block about 10 in. long is used. The first blow causes the prongs of the fastener to penetrate the back face of the panel, and succeeding blows clinch the prongs in the panel. Upson Strong-Bilt panels have a thickness of approximately ⅜ in.; a thermal conductivity, per hour, per square foot, per deg. F., per inch of thickness of 0.44; and a weight of 0.92 lb. per square foot. The giant size panels may be bent to permit their entrance through a doorway.

Douglas Fir Plywood

A number of technological developments have been made in Douglas Fir Plywood in the last few years. Definite standards have been adopted for the minimum moisture resistance requirements for each type of Douglas Fir Plywood and a uniform grade-marking and trade-marking policy was adopted by the Douglas Fir Plywood Association. These policies have been incorporated in the revised U. S. Commercial Standard, proposed by the industry and established by the National Bureau of Standards. Douglas Fir Plywood is now trade-marked in five general classes: Plyscord, a new unsanded sheathing grade; Plywall, the standard unfinished wallboard grade; Plypanel, the finished wallboard, finished on one or two sides or sound on two sides; Plyform, a water-resistant plywood for concrete forms; and Ext-DFPA,

a highly water-resistant plywood for permanent outside exposure (described in another section of this issue). All grades are made in various standard sizes and thicknesses.

The Plypanel grade of Douglas Fir Plywood has been used widely and very effectively in recent years for interior finish. It is available with a wide range of standard trim, cornice and panel mouldings for many types of architectural effects. The natural grain of the plywood may be brought out in the finish, or the grain may be hidden by a special treatment before painting.

Celotex Interior Boards

The Celotex Corporation, Chicago, has added four new colors, green, buff, ivory and a blend of light brown tones, to its line of interior finish cane-fiber insulation boards and now provides these boards in the various sizes of tile boards and planks with new, concealed nailing joints. In addition, a new wainscoting has been developed with a tough, brown leather-like surface of great durability. Moldings, friezes, trim and ornaments are also available. The interior finish boards are made in thicknesses of ½ in. and in 1 in. and in various sizes of tile board and plank or in the large size board 4 ft. wide and 8 to 12 ft. long.

Kolor-Fast Nu-Wood

A fade-proof colored surface of good acoustical properties named Kolor-Fast has been developed for Nu-Wood insulating interior finish by the Wood Conversion Company, St. Paul, Minn. The new type of coating has a noise reduction factor of 0.35. In coating Kolor-Fast, each surface fiber is coated individually. When the fibers are matted into insulation board units, tiny spaces are left between the fibers. Nu-Wood Kolor-Fast board is available in tan, and the tile and plank in variegated and tan colors. A new tongue and groove joint treatment has been used on the plank and tile, making the bevel at the joint less obtrusive and more refined and a new clip system for blind nailing is now available.

Fireproof Curtain Wall

Johns-Manville, New York, has developed a patented method of wall assembly which is suitable for practically all types of industrial buildings, known as J-M Industrial Curtain Walls. This type of wall consists of a one-inch insulating board to which an interior veneer of flat Transite ⅛ in. thick is cemented to the insulating board by a special process. The exterior surface of the wall is covered with corrugated Transite. Between windows, an exterior sheet of ⅜ in. flat Transite is cemented to the insulating board. It is said that the use of insulating board between Transite for the surfaces provides fireproof walls which not only are incombustible, since Transite is of asbestos-cement composition, but also are capable of withstanding high temperatures without melting, cracking or buckling, and that laboratory tests show that a one-inch thickness of insulating board encased in this manner affords the same insulating value as a 14-in. thickness of common brick, and yet weighs approximately 1/20th as much.

Units of the encased insulating board are held against the steel framework of a building by cadmium-plated bolts, and gray caulking compound is applied to the edge of each sheet. Since the thermal expansion of Transite is approximately the same as that of steel, no expansion joints are necessary. No special tools are required for the erection of these curtain walls, as the material may be easily sawed, drilled and fitted into place with ordinary carpenter's tools. In the event that alterations are necessary, the curtain wall units may be relocated, with almost complete salvage of materials. The walls are light gray in color and require no painting.

Tempered Presdwood and Presdwood Temprtile

Among the insulating boards and wall boards produced by the Masonite Corporation, Chicago, is Tempered Presdwood. This product is subjected to great pressure in its manufacture and is said to have a surface as smooth as glass, to be highly moisture-resisting and to be free from warping, chipping, splitting and cracking, when properly applied. It is available with various types of grooving for decorative effects and can be cut or sawed with ordinary wood-working tools and nailed to studs. It may be painted and re-painted or enameled. Presdwood Temprtile is similar to Tempered Presdwood, but with tile scoring and an enameled finish. It is available in 4-ft. by 12-ft. boards in various colors and combinations of colors. Both materials may be used with a wide variety of trim and moldings, including metal moldings.

Doors, Windows, Insulation

IN doors and windows, the newest developments have been in the direction of metal construction with simple lines, correctly styled for certain classes of construction, and in the use of corrosion-resistant materials in other construction. Recent emphasis on insulation and air conditioning has led in many instances to weather stripping and the use of double-glazed windows. The modernistic trend in construction has made use of glass blocks to achieve buildings of striking beauty, with added advantages of insulation and light interiors.

The impetus toward air-conditioning, with closer attention to the proper humidity of the atmosphere and consequently more healthful living and working conditions, has led to the development of new types of lath and sheathing insulation for exterior walls, which are designed to prevent condensation in the walls. For convenience, this specialized development is described in this section rather than in the sections on Interior Walls or Siding, which contain descriptions of other wallboards and sheathing of high insulating value. Numerous other types of insulation have also been developed, paper encased in bolts or rolls, in blocks, or in bulk. Most of these materials are cellulose or mineral substances which, by treatment or construction, contain many tiny air spaces.

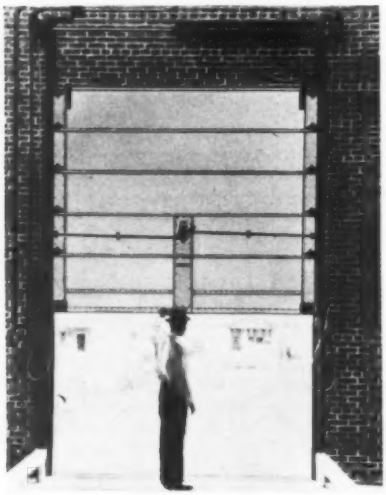
In the following paragraphs a few of the recent developments in doors, windows and insulation are presented:

Kinnear Rol-Top Doors and Safety Device

One of the most recent additions to the line of industrial doors made by the Kinnear Manufacturing Company, Columbus, Ohio, is the vertical, sliding all-steel Rol-Top door, which is made up of heavy transverse sections of galvanized copper-bearing steel, reinforced by steel plates at points where hangings and fastenings are applied. The door is equipped with ball bearing rollers which operate in vertical steel tracks applied to the door jambs. The door is connected to a torsion-type counterbalance, consisting of a helical spring, by heavy, plow-steel cables. When closed, it may be locked by means of a cylinder twist lock, operating lock bars which engage slots in the steel track. The door can be furnished in any practical size and any number of sections required. It is claimed that the door will not warp, pull apart or sag and that it is highly resistant to weather, fire and abuse.

The Kinnear Manufacturing Company

has also recently developed an automatic safety device for motor-operated rolling doors and for other upward-acting doors, which prevents injuries to persons or damage to property, if the door should be



Interior View of A Rol-Top Door

closed carelessly by attendants when the opening is not clear. The device consists of a compressible weatherstrip containing air, which is placed along the bottom of the door. If the door comes in contact with any obstacle on its descent, the air in the weatherstrip is compressed and forced through an impulse switch which immediately stops the door or returns it to the open position, depending upon the type of control installed. It is said that only slight pressure on the weatherstrip is sufficient to secure quick and positive action, and that if the door strikes a person it will cause only slight discomfort.

Celotex Insulation

The Celotex Corporation, Chicago, has developed a rock wool blanket, and a Vapor-seal lath and sheathing which provide vapor control. Celotex Vapor-seal lath is essentially a cane fibre board with a vapor barrier, consisting of coatings of asphalt and aluminum. It is made in sheets 18 in. by 48 in. in area and ½ in. and 1 in. thick. The ½-in. thickness is coated on the back side with the vapor seal, while the 1-in. thickness incorporates the vapor seal midway between its surfaces. The vapor seal sheathing is of similar construction.

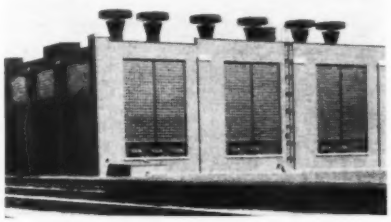
It is said that tests have shown that where ½ in. of vapor-seal lath is used with 1 in. of Vapor-seal sheathing, this combination results in a reduction of 40 per cent in heat losses through a wall, as compared with ordinary plaster, lath and sheathing. When Vapor-seal lath is to be used alone, it is recommended that the 1-in. thickness be used to provide moisture protection. The principle of vapor control is to provide a vapor seal at a point in the wall safely above the dew-point of the warm moisture-laden air, even in winter weather.

The new Celotex rock wool blanket is designed to provide continuous insulation without heat-leaking joints. It is made 14½ in. wide, to fit snugly between wall studs, joists and rafters, and is furnished in rolls so that single pieces can be cut to extend the full length of the spaces.

Insulux Glass Blocks

The Owens-Illinois Glass Company, Toledo, Ohio, now provides its Insulux hollow glass building block with either a smooth or a ribbed face and in various designs for decorative or light transmission effects. These designs or patterns are classified in two groups; blocks designed for light transmission through large glass areas where close work is done, and buildings where the decorative qualities are paramount, or where the blocks are used in the north wall of a structure. Several types of blocks, which vary in their degree of light transmission, are made for either requirement. This degree of light transmission ranges from approximately 73 per cent to as high as 86 per cent.

A number of other advantages are claimed for glass block construction, in addition to the factors of light transmission and beauty, such as a high thermal insulation value, a low sound-transmission factor, ease of cleaning (some of the ribbed blocks being more or less self-cleaning by the action of rain) and low maintenance costs. Glass blocks are laid with a mortar bond, with expansion joints



Glass Blocks Were Used Extensively in the Construction of This Paint Shop

provided at the junction of the panels with other materials except at the sill. The blocks are usually set in a chase at the edge of the panels and the joints are caulked with oakum and pointed with a waterproof caulking compound.

Flintkote Insulated Construction

The Flintkote Company, New York, has developed a double insulated wall construction for frame buildings, using its Flintlock asphalted sheathing on the outside and its insulating lath on the inside, which materials combine the functions of insulation, sound-deadening and plaster base. Flintlock asphalted sheathing is an asphalt-treated insulation board with an aluminum surfacing on the stud side. It is 25/32 in. thick and is made in a 2-ft. by 8-ft. size with tongue and groove edges which seal out the wind. The sheets are applied horizontally and are said to be moisture-proof, rot-proof and termite-proof, and to cut cleanly and add materially to the strength of the structure.

New Steel Door

The J. G. Wilson Corporation, New York, has developed a new line of overhead rolling steel doors called Steel Sectionfold doors. The doors are made of horizontal panels of galvanized or bonderized (rust-resisting) sheet steel of 16 to 20 gage thickness. The panels are joined together horizontally by a continuous reinforcing hinge and are reinforced on the edges by 1¼ in. by 1¼ in. by ⅛ in. steel angles. The doors are made up of horizontal sections 2 or 3 panels wide for widths up to 11 ft. 10 in., and of 4 to 7 sections for openings to 14 ft. in height. They are mounted on tracks applied to the door jambs which extend overhead inside the building. Operation is by hand, chain or motor. Glass panels may be built in the door wherever desired. A helical spring and gears above the door provide the lifting mechanism.

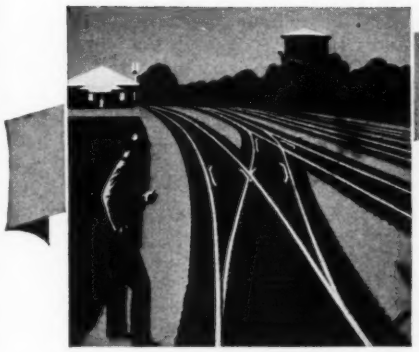
Truscon Windows, Casements and Screens

The most recent developments of the Truscon Steel Company, Youngstown, Ohio, in the improveemnt of its line of steel windows and casements, to improve their ease of operation, weather tightness and architectural beauty, are spring bronze weatherstripping, factory installed; spring-balanced construction, equipped with tapes of Enduro stainless steel, which do away with sash cords, weights and pulleys and the manufacture of windows and steel casements in bonderized (rust-resisting steel) with a baked-on priming coat of paint, producing a surface of great resistance to corrosion. Truscon steel windows are said to be weather-tight, rattle-proof, easy and noiseless in operation and warp-proof.

Johns-Manville Rock Wool

Some years ago, Johns-Manville, New York, developed a rock wool insulation which is now produced in bats of convenient size for placing between rafters and studding. The latest form of these batts is termed Super-Felt batts, which are made with a paper backing. Super-Felt batts are said to be tough and may be twisted or folded without cracking, breaking or loss of material, and for that reason they can be easily handled and placed.

This company has also developed a process of insulating existing frame structures by blowing nodulated rock wool into the spaces between rafters and studding. Rock wool is a light, fluffy material made from molten mineral. It is fireproof, and four inches of it are said to be equivalent in heat insulation value to a solid stone wall 11 ft. thick.



WHAT'S the Answer?

Programming Section Work

Where section gangs have been reduced to substantially skeleton organizations, is it practicable to program routine section work? If not, why? If so, what are the advantages?

Only Protective Gangs

By J. C. Patterson
Chief Engineer Maintenance of Way, Erie, Cleveland, Ohio

Where section gangs have been reduced to substantially skeleton organizations, they are simply protective organizations to maintain safety. Since unsafe conditions do not develop in program order, that is, according to schedules, it does not appear how their remedy can be programmed. If routine section work is desired from these gangs, the organization would have to be expanded until it becomes larger than the skeleton one.

Is More Important

By W. H. Hillis
Assistant Chief Operating Officer, Chicago, Rock Island & Pacific, Chicago

Where the section forces have been reduced until the gangs are substantially skeleton organizations, the programming of their work is as important, and often more so, than the programming of the working season. While it is true that, on the basis of winter forces, approximately 50 per cent of the work performed is non-productive, at the same time it should not be overlooked that even the non-productive work is of vital importance to the successful operation of the railway and to the on-time performance of its trains.

The non-productive work consists of keeping interlockings, switches, flangeways, platforms and other facilities clear of snow, ice, frozen debris and other obstructions that may place a handicap on train operation. The amount of time that can be devoted to productive work will, obviously, vary to a large extent, depending on weather and local conditions. For these reasons, the programming of this work of the individual gangs should be left to the local supervisory officer, who, with his knowledge of local conditions and from experience, can forecast with considerable certainty the funds and force that will be available, and is in the best position to set up the program. All other winter work, such as gaging, changing joint bars, renewing tie plates and changing out defective rails and other track materials, is just as vital to the safe and successful operation of a railway as the regularly programmed summer work, so that the local officer should program these items, using as a basis for this program his knowledge of conditions as mentioned.

In carrying out the program of constructive work, it is inevitable that emergencies will arise from time to time that demand variations from the program, for which reason it will be well for the local officer to program his constructive work for the entire estimated minimum-force period, which, in the northern climates, will approximate four months. It will be found that while the weather may necessitate an increase in the non-productive emergency time during one period, this will usually be offset during some other period of the winter season, and by careful supervision the roadmaster can usually complete his productive program for the season and, at the same time, can handle his

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In April

1. Should men who are nearing the retirement age or younger men be employed as crossing watchmen? Why?

2. Can bridge and building work be programmed? If not, why? What are the advantages and disadvantages?

3. In view of the longer sections and smaller section gangs today, is it practical to assign the care of main-line switch lamps to one man? If not, why? If so, what are the advantages and disadvantages?

4. Under what conditions is it desirable to apply tower and longitudinal bracing to a timber trestle? How should the brace timbers be attached?

5. What causes track motor cars to "shimmy?" What are the effects? What can be done to prevent the trouble?

6. What is meant by the term excess treatment as applied to water softening? Under what conditions is it desirable? What factors govern the amount of this excess?

7. Should relayer rail from tangents be reversed or laid with the original gage side in? Why?

8. How does one prepare tinted paints? What precautions are desirable? How can tints that have already been applied be matched?

emergency work with minimum interference with traffic.

One of the serious winter problems is to get the forces back on productive work without undue delay after a period of seasonal emergency work. It often happens that foremen will continue unnecessary cleaning of snow and ice after the weather has moderated so that further work of this character is not essential.

Should Be Planned

By H. R. Clarke

Engineer Maintenance of Way, Chicago, Burlington & Quincy, Chicago

As track work is now handled on many roads, it is difficult to determine when section gangs have been reduced to substantially skeleton organizations, as phrased in the question. It has been learned that with the present track structure, which is so much stronger and more permanent than that of a few years ago, a much smaller force can maintain it adequately. The development and adoption of work equipment have made further reductions possible. The organization and allocation of the maintenance forces are influenced by the necessity for planning all operations to take full advantage of the work equipment assigned. Furthermore, the urgent need for eliminating or greatly reducing slow orders is a very important factor in determining the assignment of the force and how it shall be organized.

All of these factors have combined to result generally in much smaller section forces than was once the case. Therefore, even when working the maximum force, we find that the section gangs of today are not much larger than they were some years ago when they were reduced to a so-called skeleton basis. It is not uncommon for the average section gang to consist of a foreman and three laborers, at the height of the working season, and when the force is reduced, it may comprise a foreman and only one man, or at times only a foreman.

Even so, regardless of what the force may be, it is practicable and highly desirable to plan definitely the work that is to be done. Usually, the best way to do this is for the roadmaster or supervisor to discuss, from time to time, with the section foreman, the work that is to be done on his section for the next few days, or until there is opportunity to continue the planning. In this way, the supervisory officer can keep closely in touch with conditions and know exactly what is being done. He will be directing the work on his territory as a whole, not leaving it to the judgment of the individual foreman.

This will result in a much more uniform track condition than would be possible otherwise, and more work will be done. The supervisory officer should not attempt to plan or program the work while sitting in his office, and then send iron-clad instructions out to the foreman. This will not develop foremen, besides which many important items that should be done will be overlooked, if this type of long-distance planning is indulged in.

The foregoing plan may not appear to be the programming of routine section work, but the suggesting that a definite program or schedule of work should not be set up too far ahead, does not mean that the supervisory officer should not have such a plan well mapped out in his own mind for some time ahead. Obviously, he will adhere to this general plan as closely as is possible, modifying it from time to time as he discusses the work with the foreman and as conditions make necessary. Handled in this way, the supervisory officer will know at all times what is being done. He will have full control of the situation and, at the same time, if his handling is proper, he will make his foremen feel that they have had a part in planning the work and that they are responsible for its execution.

Welding Circle Rails

Are there any advantages in welding the circle rail for a turntable to make a continuous rail? Any disadvantages? Why? If not, should the rails be end-hardened?

Considers It Desirable

By A. L. Bartlett

Engineer Maintenance of Way, New York, New Haven & Hartford, New Haven, Conn.

The circle rail for a turntable is in the nature of an orphan; the bridge and building forces, who have responsibility for the maintenance of the table, naturally shy at anything that has the appearance of track. By the same token, the track forces feel that anything connected with a turntable is no part of their work. While there may be no reason for this situation, it does exist, and any effort to reduce maintenance is particularly valuable from an operating as well as an economic standpoint.

As in track over which trains operate, joints represent a large part of maintenance, and the elimination of these joints in turntable circle rails does away with joint troubles, providing a true surface for the turntable wheels. This is particularly valuable in the three-point bearing tables and for highly improved traction on tables equipped with tractors. The elimination of impact on the tractors is a large factor in reducing the expense of maintenance on that type of equipment. The extreme rigidity of welded circle rails, compared with undermaintained jointed rails, reflects a saving in ties, owing to decreased mechanical damage. On the whole, welding of the circle rail is a very desirable procedure—one of the many necessary for continuous successful operation in busy engine terminals.

Sees Many Advantages

By A. E. Bechtelheimer

Assistant Engineer of Bridges, Chicago & North Western, Chicago

In the operation and maintenance of turntables, there are many advantages to be gained from welding the joints in the circle rail to make a continuous rail. The introduction of the three-point support type of turntable changed the function of the circle rail completely. In the balanced type of turntable, the circle rail supports the table ends only when locomotives enter and leave the table. In the three-point support type, the circle rail supports the ends of the table at all times. Obviously, little is to be gained by welding the circle rail for the balanced type. Furthermore, the lighter rail sections ordinarily used for the circle for the balanced tables are not so well suited for welding operations as the larger sections, namely, 100-lb. or heavier, that are used for the three-point support tables.

It is known that the T-rail is not the ideal section for three-point support tables, but it is used because it is readily available, and the rolling or fabrication of a special section would increase the first cost of the installation

considerably. A suitable section for this purpose would be similar to the treads under the turntables of swing-type drawbridges, in which the width of the tread is equal to or greater than the face of the rollers.

The wheel loads on the circle rail of the three-point support type of turntable are double the static wheel loads of locomotive drivers and are somewhat more than the total static and dynamic-augment loads. These loads cause the following adverse effects on the circle rail:

(a) Flattening of the rail ends at the joints.

(b) Wear on the base of the rails and on the bearing plates under the joints.

(c) Straightening of the rail at the joints, resulting in tilting the rail and poor alinement adjacent to the joints.

(d) Creeping of the circle rail, which moves the rail joints off their bearing plates. This intensifies the foregoing adverse effects, because the joints then become supported inadequately.

A condition that contributes to the actual failure of the rail joints is the corrosion of the web under the joint bars. These bars trap the acid-laden moisture reaching the joints and thus cause severe corrosion and the development of horizontal cracks in the webs at the ends of the rails.

Welding the circle rail overcomes each of the foregoing faults, because it eliminates the joint where all of the trouble occurs. The welded joint fully splices the rail for a moment, while the joint bars splice only a part of the moment value of the rail. The impact on the end-wheel bearing is eliminated since the rail is perfectly smooth at the joints. The tilting of the rail and misalinement are overcome. The welded rail may creep, but there is no objection to its doing so. Removal of the joint bars facilitates the application of protective coatings to the webs and tops of the base of the rail for the entire circumference of the circle rail.

It is generally assumed that special anchorage is required if the joints in the circle rail are to be welded. However, investigation of a number of welded circle rails does not bear out this assumption. In all cases that were investigated no changes had been made in the existing rail anchorage, except to put the rail in good alinement and to make all anchors fully effective. It should be kept in mind in this connection that the support and anchorage for the circle rail for a three-point support type of turntable are quite different from those in use for the balanced type of turntable. It is doubtful whether the hardening of the ends would be of any real advantage in circle rails.

Emergency Building Stocks

What items of emergency stocks should be carried for buildings? Why? Where should they be located?

Keep in Storehouse

By A. G. Dorland
Assistant Engineer, Elgin, Joliet & Eastern, Joliet, Ill.

Emergency stocks for repairs to buildings should be kept in the storehouse of the supervisor of bridges and buildings. The amount of the emergency stock that is required will be determined largely by past experience, but it is safe to assume that it should be sufficient to care for the needs of the division for six months. Then as the material is used it should be replaced, so that sufficient material will be on hand for all emergencies.

Probably the minor items used most frequently in districts where severe windstorms prevail, are window glass, downspouts, gutters and roofing materials. Other supplies needed are window and door casings, window sash, wall board, siding and framing lumber, both treated and untreated, the latter being for temporary repairs; and a varied supply of wood blocking and short piles, both preferably treated, should be kept on hand. A small supply of concrete blocks, of both common and face brick, and some sand, gravel and cement, are desirable additions to this stock.

If small heaters are used, complete heating units should be kept in stock, as well as radiators, stove pipe, furnace repair parts, particularly grates, etc. All kinds of plumbing fittings represented on the division should have spare parts in the emergency stock, such as various sizes of pipes, pipe fittings, valves, toilets, flush boxes, faucets and drain tile of various sizes. Fuses, bulbs and other electrical material should be easily accessible. A small amount of paint of all standard colors should be on hand at all times.

If the supervisor of buildings will study the list and quantities of materials used in the past, he will be able to make a close estimate of the kinds and quantities of the materials he will be likely to need for emergency repairs. His experience should also enable him to say where this material should be stored until it is needed.

Does Not Favor

By General Inspector of Bridges

For several reasons I am opposed to emergency stocks of building materials. In the first place, the necessity for maintaining such stocks can seldom be justified by the actual requirements over a period of years; second, the number of items required to construct a building is large, but the quantities of some of the items are small; many items, such as hinges, window catches, etc., are themselves small and easily lost, even with the best of supervision; and emergency lumber for buildings cannot be given preservative treatment to advantage.

Buildings are seldom destroyed by storms, but where this does occur the damage is of such magnitude that no division stock is able to meet the requirements of the emergency. In more than 25 years, I have seen only two emergencies of this kind, one an engine terminal and the other a shop plant and engine terminal, in both of which the destruction was complete. Likewise, with the careful attention that is now being given to fire hazards, the probability of destruction by fire has been greatly reduced, although fires do occur much more frequently than destructive storms. Yet, the probability of a serious fire occurring on any division is somewhat remote.

A bill of material for a building of almost any design, except platform shelters and those of the most temporary character, contains a large number of items, but the quantities that are needed of some of these items is small, and the devices themselves are also small. For this reason, they may be easily lost, particularly if an emergency requiring their use comes at the end of a long period of immunity.

Timber trestles can be standardized and the material entering into them can be preframed and treated. This can be done with the same facility for material intended for an emergency stock as if it were intended for immediate use in a given structure. This is not so easy with building material, for, while there should be no particular difficulty in preframing and treating the material for a particular building, the fact that there are more than 100 different types of railway buildings indicates the impracticability of complete standardization of the material entering into them.

In a trestle, except for different pile lengths, which offers no particular difficulty, the material required for a bent and span can be repeated indefinitely to produce a bridge of any length. If an emergency stock of building material has been located on a division, the lumber will be either uncut or it will be preframed for a particular design of structure. If a building of any other type or dimensions is destroyed, the emergency stock will be useless for replacing it.

It may be suggested that emergency building lumber can be given preservative treatment and that it should be used and replaced at approximately stipulated intervals. If this material is preframed, it can be used in certain structures only, the same difficulty as mentioned previously, but in this case it will be in routine repairs as well. If it is not preframed, the treatment will be useless after it is applied, as it will be necessary to cut it to length or frame it to make it suitable for use.

Such materials as door and window hardware, window glass, items required in heating equipment, plumbing, etc., which must frequently be given emergency attention, do not, I assume, fall in the emergency classification intended by the question, despite the fact that the call for them is often fully as urgent as for others.

Changing Engines in the Field

To what extent is it practical to replace worn motor-car engines in the field? What are the advantages and disadvantages? How should it be done?

Entirely Practical

By F. S. Schwinn

Assistant Chief Engineer, Missouri Pacific Lines, Houston, Tex.

In connection with certain studies that were undertaken by the writer during recent months, the opportunity was afforded to visit the motor car repair shops of a number of railways. On five of these roads, each of which represented a considerable system mileage, it was found that the practice of replacing worn motor-car engines in the field has been adopted as standard in the maintenance of their section motor cars. This same practice has been in effect on the southern lines of the Missouri Pacific for a number of years and has been found to be entirely satisfactory and to result in desirable economics.

Experience has shown that, generally speaking, the standard section motor car can be operated for a period of from four to seven years without a general overhauling, depending on the service to which it is subjected. This time period is equal to the service life of two motor-car engines. The engines usually need to be overhauled every two or three years because of scored cylinders, burned-out connecting rods or similar reasons. The question then resolves itself into one of two things: Should the entire motor car be shipped to the shop for the needed repairs, or should the engine only be turned in?

Practically all makes of the section type of motor car, that is, single cylinder engines with either belt or chain drive, can be removed quickly and easily from the motor-car frame in the field, as there are only four bolts used in attaching the engine to the car sills. In addition to removing the bolts, it is necessary to disconnect only two timer wires and a spark-plug wire when making the exchange of engines. The exchange can be made by either the division motorcar maintainer or the section foreman, with the assistance of one laborer, in less than an hour. The old engine can then be placed in the crate in which the new or repaired engine was received and shipped back to the motor-car shop.

The advantages of this practice are:

1. The use of the motor-car frame for the full period between necessary overhaulings.
2. A reduced investment in motor-car equipment, which would be necessary to effect the more frequent exchanges of motor cars.
3. Less interference with the work of the section gang through elimination of the need for loading and unloading the motor car, when only the engine requires repairs.
4. Similar economies through the reduced handling of complete cars at the motor-car shop.

Is Opposed to It

By O. T. Prince

Section Foreman, Central of Georgia, Godfrey, Ga.

Worn motor-car engines should not be replaced in the field. A motor car is a highly important and useful machine and should be treated accordingly. A new engine of any design suited for motor car use, if cared for properly, will outwear the chassis. One does not need to spend much time tinkering with an old worn-out motor car to equal the cost of a new car and a new engine. This is confirmed by my long experience with motor cars. No certain interval should be set up for inspecting and tightening motor cars, but they should be watched carefully and this work done whenever necessary.

When a motor-car engine requires replacing, it should be sent to the motor-car repair shop. At this time the chassis should be gone over and given whatever repairs are required. The shortened life of a motor car results most largely from the way it is handled off and onto the track, while the life of the engine depends on the degree of perfection to which it is tuned.

In this connection, one must use one pint of oil to a gallon of gasoline to lubricate a gasoline engine properly. This will be sufficient to lubricate the engine and make it start quickly in any kind of weather, it will also prolong the life of the engine.

An Excellent Practice

By District Engineer

It has not been many years since our motor cars and motor-car engines gave us almost unlimited trouble and we rarely had one, except when new, that was in satisfactory condition. We were forever sending them into the shop and getting them back, sometimes in as bad condition and sometimes worse, but always in unsatisfactory condition. In those days we had no field repairman, since we relied on the mechanical department to maintain our cars and other work equipment, and no one to instruct the foremen how to operate their cars to insure minimum wear of the engines and least damage to the frame. The result was that the frame and the engine had about the same period of service life and both were far from being in satisfactory condition during most of this period.

Today this situation has changed. We have our own maintenance shops and a maintainer on each division. He teaches the foremen how to operate their cars and calls their attention to undesirable practices they may have fallen into, and their effects. The foremen have responded quite satisfactorily to this instruction, with the result that today the motor car itself outlasts two engines.

One of the first things the new sys-

tem uncovered was that we had a large number of cars in exchange service, that these cars were performing no productive service and that we were getting no return from them. After we got organized, we tried out the idea of exchanging engines in the field and have found many advantages in the practice, not the least of which is that we have made a still further reduction in the number of our exchange cars. Our engines last longer, that is, the overall service life is greater, and their average condition is better.

Testing Pipe Lines

Should a new pipe line, or one that has received extensive repairs, be tested before the trench is back filled? Why? If so, how should this be done?

Is Good Practice

By Supervisor of Water Service

Every pipe line should be tested to the allowable maximum pressure of the pipe at the time it is laid. This is the best insurance I know against future leakage and possible large waste. This test is not only to determine whether the joints have been made properly but to determine also whether there is any cracked or otherwise damaged pipe in the line. Leakage after the trench is filled may persist for years without detection, so that the loss from waste may be many times the cost of the test. One of the difficulties encountered in arranging for such a test is that the officers who have charge of the facilities that are to be served by the pipe become extremely impatient to get it into service and usually bring pressure on the water service department to get it completed at the earliest possible moment. As a result, the test is often omitted to hasten the date of completion.

Tests should be made by hydraulic or compressed-air methods, preferably the first, on sections approximately 1,000 ft. long, or as near this as practicable. Equipment for making these tests is easily available. A small meter should be used in connection with the test to measure any leakage that may occur. Before the pipe is inserted in the line, it should be inspected and sounded for cracks or other defects.

Should Be Tested

By J. P. Hanley
Water Service Inspector, Illinois Central, Chicago

It is good practice to test pipe lines for leakage before back filling, where this can be done without interfering with traffic or where expensive bracing is not necessary to prevent caving. Such a test gives visible evidence that no leakage involving future water waste is occurring before the trench is filled. The most favorable conditions for testing before back filling occur in long pipe lines remote from tracks and streets, where a section of approximately 1,000 ft. can be installed and tested before proceeding with the next section. In such tests, a portable water pump or air compressor may be used after the pipe ends have been closed with temporary plugs, which are tapped for inlet, outlet and pressure-gage connections. The pressure applied should be the maximum working pressure expected on the line, plus the usual safety margin. If water is not available for testing, compressed air may be used, in which event the pipe joints should be brushed with a soapy solution that will form bubbles if small air leakage is present.

The best way to secure minimum leakage and satisfactory tests is to inspect the pipe carefully and sound it for cracks and other defects and by careful installation and inspection of every joint. Many pipe lines installed by company forces are not tested specifically either before or after back filling until the service test of actual working conditions is applied. However, in contract work it is advisable to have a test made before back filling, if practicable, or after back filling if it is necessary to defer it.

Rail and Flange Lubricators

What advantages result from the use of rail and flange lubricators? What disadvantages? What is the minimum degree of curve to which they should be applied?

Many Advantages

By H. G. Carter
Division Engineer, Central of Georgia, Columbus, Ga.

My experience with rail and flange lubricators proves that they possess many advantages for the maintenance of way, the mechanical and the transportation departments. We first applied these lubricators on a district having heavy grades and upon which 6-degree curves predominated. This is a single-track line, primarily for freight traffic. The benefit in the reduction of the labor required for maintaining gage became apparent immediately. This was followed by decreased rail wear and locomotive-tire wear, indicating a proportionate reduction in all wheel-flange wear. Again, the decrease in friction brought about by the lubricant reduced the amount of labor required to maintain curve alignment and at the same time improved the riding comfort of the curves.

Later we installed lubricators on yard leads. The advantages here were freer rolling cars, less gaging and less rail wear on the lead curves, less replacement of switch points and a general reduction in track maintenance as well as in the flange wear on switch-engine tires and tank-wheel flanges. We have since installed rail and flange lubricators on primary lines, where we obtain the same benefits as elsewhere from them.

The advantages of rail and flange lubricators are many and economy results from their use. These advantages include reduction in the friction between the rail and the wheel flange, and thus in the amount of rail and flange wear; reduction in the amount of gaging and lining required for the curves to which the lubricators have been applied; and a decrease in the wear on crossties. Lubrication of the rail and wheel flanges permits increases in the tonnage that can be pulled up grades and also in the speed of tonnage trains, as well as more comfortable riding around curves. If there are any disadvantages, they consist of the cost of maintaining and operating the lubricators, for if the device is maintained properly there can be no disadvantage to train operation.

Lubricators should be applied on curves of 4 degrees or sharper, to realize the full economy of their use. The sharper the curve, the greater the saving that can be realized. On the other hand, a decided improvement

can be effected in the riding of 3 degree curves through proper lubrication of the outer rail.

No Fixed Minimum Degree

By W. J. Bergen, Jr.
Chief Clerk, New York, Chicago & St. Louis, Cleveland, Ohio

Lubrication of rail and wheel flanges can be accomplished by any one of four methods, that is, by mechanical lubricators installed in the track, by rail lubricators on the locomotives, by flange lubricators on the locomotives or by hand applications. The use of the first method is increasing and the use of the remaining methods is decreasing. The advantages of rail and flange lubrication are (1) longer life of rail on curves, (2) longer life of locomotive tires, (3) longer life of car wheels, and (4) decreased train resistance, permitting increased tonnage, greater speed or decreased fuel consumption. About the only disadvantage of this form of lubrication is locomotive-wheel slippage, and less difficulty of this nature is being experienced with the present equipment for lubrication.

There is no fixed minimum degree of curve to which lubrication can be applied to advantage. The need for lubrication is the result of a combination of factors, including the degree and length of the curve, the rate and direction of the gradients, the character and density of traffic and the type of power in service on the district.

A separate analysis must be made for any curve to determine the annual savings that are possible and this saving can be compared with the annual cost, including interest and depreciation, of a rail lubricator, to determine whether the installation of the device can be justified. These items deal only with the financial aspect of an installation. There are, however, other less tangible advantages, such as improved train operation, which might make the installation advisable when the financial considerations might not justify it.

Regards Them Highly

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

I believe that railways through mountainous or hilly country where a large percentage of the line must be curved, have saved or can save more from the lubrication of their curves than from any other single action. The reduction in rail wear alone is of itself sufficient to pay for the cost of the installation in a surprisingly short time, while other benefits constitute added advantages. It does not matter so much what the degree of the curve is; the important thing is whether the rail is wearing and how rapidly. If the rate of rail wear will justify the installation, it should be made regardless of the rate of curvature.

Lubrication of the rail saves ties because it is not necessary to do so much gaging as formerly. It should not be overlooked that the wear on the flanges of locomotive and car wheels is comparable, and that lubrication saves as much on one as on the other.

Renewing Culverts in Winter

What are the advantages and disadvantages of installing or renewing pipe culverts during the winter season?

Climate Has Bearing

By G. A. Haggander
Assistant Chief Engineer, Chicago, Burlington & Quincy, Chicago

The climate in the section where the work is to be done has considerable bearing on this matter. In the northern part of the United States, where the roadbed freezes, I do not consider the installation of pipe culverts by the open-trench method to be desirable. It is difficult to do a good job of backfilling and compacting the embankment with frozen earth, and a low spot in the track is likely to result from any such effort. We do, however, install pipe culverts by the jacking method during the winter, since the frozen embankment assists in supporting the track and reduces the earth pressure on the pipe. In the southern part of the United States, where there is practically no freezing of the roadbed, installation by either the open-trench or the jacking method can be carried out at any season.

Sees No Objection

By Supervisor of Bridges and Buildings

I know of no reason why pipe culverts cannot be installed during the winter with the same advantage as during the warmer months. In fact, on more than one occasion, I have, by preference, renewed culvert pipe in the winter. In many cases, even where the stream flow seems to be small, and this is especially true when the opening is located in a former or existing swamp, the water in the stream may interfere with the orderly prosecution of the work, because, when installing the pipe, the provisions for by-passing the water must be broken from time to time to permit the placing of the pipe sections.

I would not install culvert pipe by the open-trench method in northern areas during the winter, unless the reasons were extraordinary and no other method seemed suited to the emergency. One cannot excavate a trench during the winter without permitting the excavated material to freeze, and frozen material makes exceedingly poor backfilling because it cannot be compacted. Then when it thaws, settlement will occur and it becomes difficult to maintain the track. As a matter of fact, I have seen water pockets develop in the roadbed as a result of the effort to keep the track in surface over a pipe trench that was backfilled during the winter. I have had no experience with the installation of pipe culverts in the South during the winter, but, except where wet weather may create some difficulty, I see no reason why the open-trench method would not be suitable if it seems desirable to employ it.

My preference is for jacking the culvert through the roadbed where this can be done to advantage. Obviously, this is not practicable in a rock fill, and there may be no advantage in jacking through light embankments where there is little cover for the pipe. It may also be desirable to use the open-trench method when replacing a culvert to permit the placing of a timber-grillage support for the new pipe. The jacking method is ideal for the winter installation of pipe culverts, whether the pipe is being installed new or for the replacement of an existing culvert. Where the stream flow is small during warm weather, it may cease entirely during the winter. The earth around the pipe freezes, relieving the pipe of external pressure, so that jacking is facilitated and the clearance can be cut to the minimum.

One of the advantages of the winter installation of culvert pipe is that one does not need to fear or prepare for severe floods, such as often occur during the spring and may occur at any time during the summer as a result of cloudbursts. If headwalls are to be constructed, I advise generally that

this part of the work be deferred until warm weather. The volume of concrete in a headwall for a pipe culvert is relatively small; yet it will require as much preparation for heating the aggregates and mixing water, and for keeping the concrete warm, as if the quantity were much larger.

Pipe culverts are sometimes inserted in failing stone or concrete arches, box culverts or pipe culverts of larger diameter. There is no reason why the pipe cannot be placed as well in the winter as at any other season. It is generally desirable, however, to defer the backfilling until warm weather when it can be compacted to so much better advantage. One of the advantages of installing pipe culverts during the winter is that the work can be done at a time when the forces are not overburdened with other work.

Heaving at Highway Crossings

What can be done to repair a highway grade crossing when it has heaved badly?

Must Be Good for Speed

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

There is only one thing to do with a badly heaved crossing and that is to fix it. The kind of repair will depend on the character of the railway and the highway traffic and on the kind of roadbed at the crossing. On important high-speed lines, the crossing must be kept good for scheduled speeds at all times. Usually when a crossing starts to heave, it will rise without throwing the track much out of level or line. While the heaving is in progress, the approaches are taken care of with shims and the alinement must be corrected, if this is necessary, by spike lining. It may be expedient to remove the tie plates over the heaved stretch. If there is likelihood that the track will not settle down for some time, steps should be taken to dig out the crossing, correct the drainage and fix the highway.

With modern equipment, it costs little more to dig out a frozen crossing than it does a wet one. In any event, the crossing must be fixed. This can be done at a time when more productive work is not apt to be pressing. The heaving material is dug out and drainage is provided for a mat of dry cinders under the entire crossing. It may be necessary to plank for highway traffic, if it cannot be detoured while the work is in progress. Permanent repairs should await final settlement in the spring.

On secondary lines, where there will be no serious interruption to schedules if heaved crossings are shimmed and protected by slow orders, it may be expedient, by reason of lack of force or equipment, to carry the crossings through the freezing period by shimming the approaches or lowering the rail through the crossing by taking off the tie plates. Such crossings will remain somewhat of a liability throughout the freezing weather and more so during thaws, since they will not settle evenly and are quite likely to push out of line as they come down.

For these reasons, secondary-line crossings should be considered for cleaning out, draining and matting with cinders, even if this means doubling up section forces to dig them out. If the badly heaved crossings are not drained and fixed while they are heaved, they are apt to be left alone and allowed to heave again during succeeding winter seasons, for there is little incentive to disturb the crossings during the heavy working season, provided the track through the crossing remains in good line and surface.

Must Be Done in Summer

By F. J. Bishop
Engineer Maintenance of Way, Toledo Terminal, Toledo, Ohio

We have usually found it impracticable to dig up the crossing and make permanent repairs during the winter season. Temporary repairs are always made by shimming the track on either side of the crossing sufficiently to permit normal train speeds. A badly heaved crossing is conclusive evidence of poor drainage and permanent correction of this condition should be made as soon as the frost leaves the crossing in the spring.

The heaving of the track and paving at crossings is caused invariably by the presence of water in either the roadbed, the ballast or the foundation material for the pavement. The permanent remedy consists of adequate roadbed drainage at the crossing, clean ballast and dense, impervious paving. Street or highway drainage should be intercepted before it reaches the crossing. In concrete-slab, timber or plank crossings, the ballast should be left three to four inches below the slabs or timber to prevent the lifting of the crossing surface above the rail as a result of frost action.

We use a large number of asphaltic-concrete crossings. If the mixture is of poor density, water will penetrate the paving along the rail and heave the pavement, making it necessary to cut away the heaved part for the safety of both the highway and the railway. Another source of heaving is the saturation of the roadbed and ballast by reason of leaks in water lines in city streets. Where such leaks are detected, special couplings should be installed at the joints close to tracks that are used frequently. New water lines should be protected with suitable casings or special couplings to insure against leakage at crossings.

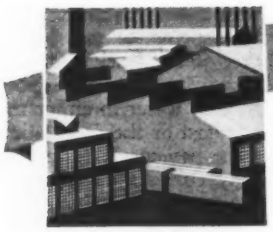
Varies with Heaving

By H. F. Fifield
Engineer of Maintenance of Way, Boston & Maine, Boston, Mass.

The reply to this question will vary, depending on the amount and the manner in which the crossing has heaved. The usual temporary remedy is to apply salt to endeavor to prevent further heaving. The next procedure is to shim the approaches to the crossing to make a gradual run-off in each direction and, in some cases, it may be necessary to adze the ties in addition to using the shims.

In case of a high raise, it will be necessary also to take up the plank or other crossing material and establish a new temporary grade to meet the grade of the highway. This is usually accomplished by shimming, if the crossing is of plank, and building up the approach outside of the ties with the best material available.

The permanent cure is to dig the subgrade out where it is poor or holds moisture, then put in a sufficient amount of crushed stone or other suitable material, and drain the crossing by means of pipe drains or ditches. It should be borne in mind that adequate drainage of the subsoil is the important factor in all tracks.



PRODUCTS of Manufacturers

Tie Nipper Saves One Man

A TIE nipper, designed for use in connection with tie renewals and surfacing track, is being placed on the market under the trade name of the Aurora Tie-Nipper, by the Aurora Railway Supply Company, Aurora, Ill. This device, which is constructed of malleable iron, consists of a bar, a toothed jaw upon which the tie rests, a cleated shoe which serves as a fulcrum and a hinged jaw arm which is designed to press against the end of the tie when the nipper is in use.

As shown in the illustration, when it is desired to nip a tie, the toothed jaw is inserted under the tie at its end, the shape of the jaw and fulcrum being designed to facilitate this insertion. The bar is then depressed until the tie is lifted to fit snugly against the rail, and the hinged jaw arm is dropped against the end of the tie. The tie is thus held securely between the toothed under jaw and the hinged jaw arm. If the ballast gives while the tie is being spiked, it is only necessary to depress the bar enough to bring the tie back against the rail.

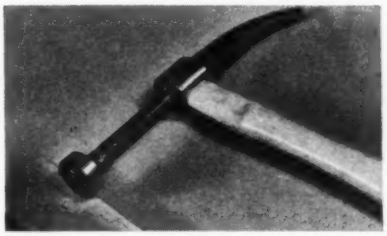
Being made of ½ to ¾-in. material, the nipper is relatively light, weighing only 14 lb. Yet it is said to be of sufficiently sturdy construction to withstand the abuse to which all devices and tools in this service are subjected normally. One of the benefits claimed for the device is that it releases one man for other duties, since the nipper can be placed without loss of time by one of the men who are engaged in spiking or tamping the tie. It is also claimed that its use will eliminate personal injuries caused by flying chips or particles of steel from spike mauls or spikes, as well as the hazard of injury from falling from the lining bar.

The Tie-Nipper Releases One Man for Other Duties

Tie and Timber Marking Hammer

A NEW tie and timber marking hammer has been added to the line of marking devices manufactured by the Pannier Bros. Stamp Company, Pittsburgh, Pa. This tool is forged from a solid piece of high-carbon steel, and has a round marking head which can be engraved with either sharp-face characters (for side-grain wood) or flat-face characters (for end-grain wood) as required. The opposite end of the hammer is designed to balance the marking head and is pick-shaped, being either straight or curved, so that it can be used for turning timbers over. The over-all length of the head is 10 in.

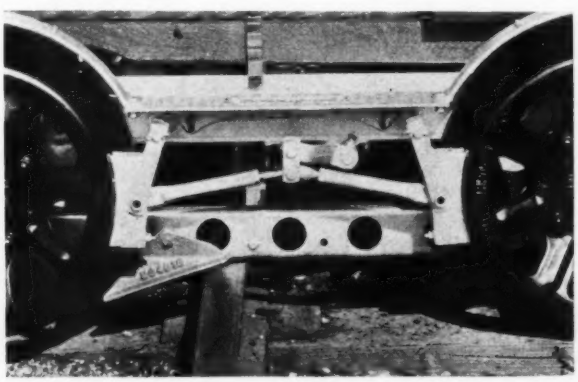
A feature of this hammer is the fact that the handle eye is waist-shaped to insure that the head will be held securely to the handle. It is equipped with an 18-in. handle of second-growth hickory and has a total weight of 2 lb.



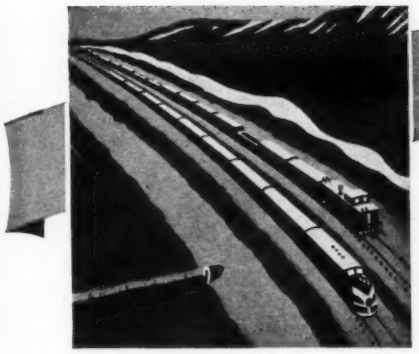
Pick-Style Tie and Timber Marking Hammer

Fairmont Set-Off Skids

FAIRMONT Railway Motors, Inc., Fairmont, Minn., has developed set-off skids which add greatly to the ease of removing an inspection motor car from the track. One set-off skid is bolted securely to each rail skid of the motor car just behind the flanges of the front wheels. In removing the car from the track, after the rear wheels of the car have been lifted to the outside of the rail, the front end is pulled over. In this operation, the car slides over the rail on its rail skids and on to the set-off skids to the point where it is easy for the wheels to climb the rail. The set-off skids are especially valuable where there are high rails, as the wheels have the same small distance to climb (from the tip of the skid to the bottom of the wheel), no matter how high the rail is. Set-off skids are furnished in pairs for the front wheels of inspection cars and can be installed either in the field or on new cars at the factory.



Showing Position of Set-Off Skids on a Motor Car Being Removed from the Track



NEWS of the Month

Mexican Roads Get Government Management

President Avila Camacho of Mexico has appointed General Enrique Estrada as general manager of the National Railways of Mexico under a new law abolishing the Worker's Administration and creating a decentralized government corporation for their administration, with complete authority for reorganization, operation and management. General Estrada has stated that an immediate return to proper standards of discipline must be made, and has already re-appointed a number of former experienced officers. A board of directors has been appointed, consisting of four government appointees and three representatives of the Union of Railroad Workers.

S. P. Gives Up Claims for More Than 2,000,000 Acres

The Southern Pacific has relinquished the right to claim more than 2,000,000 acres of public lands in Southern California, in a land grant claim release approved by Secretary of the Interior Harold L. Ickes. The release was a requisite for taking advantage of the land-grant-rate-repeal provision of the Transportation Act of 1940. Although 24 such releases had been approved for other roads up to December 30, the other releases embraced grants which had been completed and closed for some time, and no question or relinquishment of pending claims for land was involved. Thus the Southern Pacific becomes the first road to relinquish its right to claim grants not yet completely adjusted or closed.

$9,120,250 for Interstate Commerce Commission

In his budget for the coming fiscal year, President Roosevelt asked Congress for $9,120,250 for the Interstate Commerce Commission to carry on its activities during the fiscal year 1942. This figure is an increase of $61,500 over the amounts appropriated for the fiscal year 1941. The increase was asked to permit the commission to employ additional personnel for its enforcement of motor transport regulations.

In his budget message, President Roosevelt also suggested that it seemed appropriate at this time "to defer construction projects that interfere with the defense program by diverting manpower and materials. With this in mind, I am recommending reductions for rivers and harbors and flood-control work. Where possible, without placing the projects or the water users thereof in jeopardy, reductions are proposed in the expenditures for reclamation projects."

Two Railroad Men Honored

One of the highest engineering awards in America, the John Fritz medal, was awarded on January 15 to Ralph Budd, transportation member of the National Defense Advisory Commission and president of the Chicago, Burlington & Quincy. The John Fritz medal is awarded for notable scientific and industrial achievement by a board of sixteen engineers, appointed in equal numbers from the membership of four national societies, the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. Also on January 15, honorary membership in the A.S.C.E. was conferred on Frank G. Jonah, chief engineer of the St. Louis-San Francisco.

$134,062,500 for Roads and Grade Crossing Work

Federal Works Administrator John M. Carmody has apportioned $134,062,500 among the 48 states, the District of Columbia, Hawaii and Puerto Rico, as Federal aid for highway improvement and elimination of hazards at railroad grade crossings. The funds are available from appropriations authorized for the fiscal year beginning July 1, 1941, after deductions of administrative expenses, and are to be expended under the supervision of the Public Roads Administration. The apportionment was authorized by the Act of September 5, 1940, which provided $100,000,000 for improvement of the Federal-aid system and its extensions through cities, $17,500,000 for improvement of secondary or feeder roads, and $20,000,000 for elimination of hazards at railroad grade crossings.

Orders $7,000,000 Pay Increase for 70,000 Railroad Workers

Wage rate increases totaling more than $7,000,000 for some 70,000 railroad track workers, red caps, dining car waiters, office and other employees will become effective March 1, 1941, Colonel Philip B. Fleming, Administrator of the Wage and Hour Division, U. S. Department of Labor, announced on January 2. The wage increase was ordered in approving a recommendation by the railroad carrier industry committee, appointed under the Fair Labor Standards Act (Federal Wage and Hour Law), after an extensive investigation of wages paid by American railroads. The committee, under the chairmanship of Frank P. Graham, president of the University of North Carolina, recommended establishment of a minimum wage of 36 cents an hour for employees of trunk line railroads and 33 cents for short lines.

"About 65,000 of the one million or more persons employed by the trunk line railroads and the Pullman Company, the Railway Express Agency, car loading companies and terminal companies will receive a wage increase under the 36 cent minimum," Colonel Fleming said. "Some 5,000 of the 21,000 employees of the short lines will be affected by the 33 cent minimum rate. As carloadings are rising, the number of workers who will receive wage increases on March 1 is probably larger than these figures, based on studies made in 1939.

Army Appoints Advisory Transportation Group

A group of transportation officials has been selected as advisors to Major General Edmund B. Gregory, Quartermaster General, on all phases of Army transportation problems, according to an announcement by the War Department on January 11. Representatives of rail, water, bus and truck, and air transportation agencies, in addition to army officials, comprise the advisory group.

In announcing the appointment of the group at the first meeting, General Gregory outlined four lines of study along which the group could operate "in an effort to insure that each form of transport shall operate within its own sphere of an integrated and co-ordinated system." These lines are:

Increase of efficiency of transport in present means and methods.

The most effective use of each form of transport to meet military traffic problems.

The best use of modern transport to reduce static inventories of military stocks, with particular emphasis on a set-up that will reduce the delivery time to the consumer of items which cannot be produced on time or quantity.

What difficulties can we look for and avoid in the event of a major emergency?

In addition, the governor of each of the 48 states has been asked by the War Department to name a committee to advise and aid in the preparation of plans for Army troop movements. One member of each state committee will act as a liaison officer between the state and the Army.

Personal Mention

General

William A. Bracken whose promotion to trainmaster-roadmaster on the Northern Pacific, with headquarters at Missoula, Mont., was announced in the December issue, was born in Dublin, Ireland, on May 22, 1889 and attended Wesley College in Dublin. He entered railway service in May, 1910, as a chainman on the Canadian Pacific at Winnipeg, Man., later serving as a rodman on the Canadian Northern (now part of the Canadian National) at Spences Bridge, B. C., on the Kettle Valley Railway (now leased to the Canadian Pacific) at Penticton, B. C., and in 1915 and 1916 on the Great Northern at Seattle, Wash. He then served with the U. S. Army and in 1920 returned to railroad service as a rodman on the Northern Pacific at Tacoma, Wash. From 1923 to 1925, Mr. Bracken served as an assistant engineer and assistant roadmaster at Tacoma, and on the later date was promoted to roadmaster at Seattle, later being transferred to Tacoma. In 1936, Mr. Bracken was advanced to division roadmaster, with headquarters at Spokane, Wash., the position he held until his recent promotion.

Engineering

R. C. Mathews, roadmaster on the Atchison, Topeka & Santa Fe at La Junta, Colo., has been promoted to division engineer of the Panhandle & Santa Fe, with headquarters at Slaton, Tex.

Raymond Arthur Gravelle, whose promotion to engineer maintenance of way of the Grand Trunk Western, with headquarters at Detroit, Mich., was announced in the January issue, was born at Detroit on September 25, 1896, and entered railway service on the Grand Trunk Western on May 16, 1916, as a rodman at Detroit. He was later promoted successively to

Raymond Arthur Gravelle

instrumentman and assistant engineer of the Detroit terminal. In October, 1932, he was appointed assistant engineer of the Detroit division and the Detroit terminal and early in 1940 he was appointed acting field representative of the industrial department, the position he held until his promotion on November 15 to engineer maintenance of way.

Harvey F. Hamilton, assistant to the chief engineer of the Great Northern, with headquarters at St. Paul, Minn., retired on December 31.

Oscar Hansen, assistant engineer of bridges and buildings of the Central of Georgia, with headquarters at Savannah, Ga., retired from active service, effective January 1.

Roy Putman Hart, assistant bridge engineer of the Missouri Pacific, has been promoted to bridge engineer, with headquarters as before at St. Louis, Mo. Mr. Hart succeeds to a position that has been vacant since the promotion of **F. E. Bates** to chief engineer in July, 1938. Mr. Hart was born at Springfield, Mo., on February 14, 1892, and graduated in civil engineering from the University of Missouri in June, 1913. He entered railway service at Omaha, Neb., on June 7, 1913, as timekeeper for a system steel erection gang, later serving as assistant foreman and inspector on various bridge construction

Roy Putman Hart

projects and as a draftsman, estimator and designer in the bridge department at St. Louis. In November, 1919, he was promoted to chief draftsman and in February, 1931, he was advanced to assistant engineer. In the fall of 1938 he was further advanced to assistant bridge engineer.

L. T. Nuckols, engineer of track of the Chesapeake & Ohio, has been promoted to the newly-created position of assistant chief engineer, with headquarters as before at Richmond, Va., effective January 18. **L. J. Drumeller,** division engineer, with headquarters at Hinton, W. Va., has been promoted to engineer of track, with headquarters at Richmond, to succeed Mr. Nuckols. **H. S. Talman,** assistant division engineer of the Russell division, with headquarters at Russell, Ky., has been promoted to division engineer of the Hinton division, with headquarters at Hinton, W. Va., to succeed Mr. Drumeller. **F. P. Barrick,** assistant division engineer at Ashland, Ky., has been transferred to the Russell division to replace Mr. Talman.

Thomas Ernest Price, division engineer on the Canadian Pacific at Vancouver, B. C., has been promoted to district engineer of the Manitoba district, with headquarters at Winnipeg, Man., succeeding **J. C. Holden,** who retired on December 31. Mr. Price was born at Liverpool, England,

Thomas Ernest Price

in 1887, and graduated in engineering from McGill University in 1910. He first entered railway service on April 29, 1907, on the Canadian Pacific, and after graduation he returned to that road on April 24, 1909, as a transitman at Vancouver, B. C. On May 17, 1910, he was appointed assistant masonry inspector at Nelson, B. C., and on August 11, 1911, he was promoted to assistant engineer, engaged on hydroelectric power surveys in British Columbia and the construction of the Coquitlam terminals. Mr. Price was promoted to division engineer of the Vancouver division, with headquarters at Vancouver, on September 1, 1912, and during the first World War he served as a lieutenant with the Canadian Railway Troops in France and Belgium. He returned to the Canadian Pacific on May 1, 1919, as division engineer, at Vancouver.

R. A. Bryson, assistant division engineer of the Birmingham division of the Louisville & Nashville at Birmingham, Ala., has been promoted to division engineer of the Nashville terminals, with headquarters at Nashville, Tenn., succeeding **Owen Crawford,** whose death on January 9 is announced elsewhere in these columns. **W. K. Turner,** assistant engineer at Latonia, Ky., has been promoted to assistant division engineer at Birmingham, Ala., relieving Mr. Bryson. **W. R. Morris** has been appointed assistant engineer at Mobile, Ala., replacing **R. E. Nottingham,** who has been transferred to Louisville, Ky. **F. A. Cloud,** track supervisor on the Nashville terminals at Nashville, has been appointed assistant engineer of those terminals, a newly created position.

Arch Leckie, industrial agent of the Kansas City Southern, with headquarters at Kansas City, Mo., has been appointed engineer-roadmaster of the Kansas City Terminal division, with the same headquarters, succeeding **W. J. Lank,** whose appointment as division engineer, with headquarters at Shreveport, La., was announced in the January issue.

Mr. Leckie was born at Springfield, Mo., on September 28, 1880, and entered rail-

way service on November 19, 1901, in the engineering department of the St. Louis-San Francisco. On January 16, 1911, he went with the K.C.S. as division engineer of the Northern division, with headquarters at Pittsburg, Kan., later being transferred successively to the Kansas City Terminal division, with headquarters at Kansas City, Mo., and to the Southern division, with headquarters at Texarkana, Tex. Mr. Leckie was appointed industrial agent, with headquarters at Kansas City in August, 1920.

Charles S. Sheldon, whose retirement as engineer of bridges and structures of the Pere Marquette, with headquarters at Detroit, Mich., was announced in the January issue, was born in Lexington, Mich., on October 1, 1870, and entered railway service in 1889 on the Flint & Pere Marquette (now the Pere Marquette). A year later he became assistant city engineer at Port Huron, Mich., and in 1893 he returned to railway service as a draftsman for the Chicago & West Michigan and the Detroit, Grand Rapids & Western (now a part of the Pere Marquette). In 1899 he entered the University of Michigan, graduating in engineering in 1902. Mr. Sheldon then went with the Canadian Bridge Company for a year and in 1903, he went with the Cincinnati, Hamilton & Dayton (now part of the Baltimore & Ohio), as first assistant engineer in the office of the chief engineer at Cincinnati, Ohio. On January 1, 1913, Mr. Sheldon was appointed engineer of bridges and structures of the Pere Marquette, the position he held until his retirement.

Willard Jerome Strout, acting chief engineer of the Bangor & Aroostook, has been appointed chief engineer, effective January 1, with headquarters as before at Houlton, Me. Mr. Strout was born at Milo, Me., on May 3, 1906, and was graduated in civil engineering from the University of Maine in 1929. He entered railroad service on March 3, 1926, as a trackman on the Bangor & Aroostook, serving in that capacity until September, 1926, when he returned to school. After graduation from college Mr. Strout entered the service of the Bangor & Aroostook on June 10, 1929, as a special engineer. From June 1 to October 15, 1932, he served as acting superintendent, bridge and building department, and then served until August 31, 1938, as superintendent of the bridge and building department. Mr. Strout was appointed assistant engineer in the chief engineer's office on September 1, 1938, which position he held until January 1, 1940, when he was promoted to principal assistant engineer, becoming acting chief engineer the following month.

Willard Jerome Strout

Ralph H. Washburn, assistant division engineer on the Alton, has been promoted to division engineer, with headquarters as before at Bloomington, Ill. succeeding **Maurice Donahoe** who retired on January 1. **E. G. Wall** instrumentman at Bloomington has been promoted to assistant division engineer relieving Mr. Washburn. Mr. Donahoe was born at Williamsville, Ill., on December 26, 1868, and entered railway service in March, 1888, as a track laborer on the Chicago & Alton (now the Alton) at Alton, Ill. In 1891 he was promoted to section foreman at Alton, and in 1898 he was advanced to track supervisor at Alton. Mr. Donahoe was promoted to division roadmaster, with headquarters at Bloomington, Ill., in 1910, and five years later he was further advanced to general roadmaster, with the same headquarters. In 1925 he was appointed general supervisor of maintenance of way, with headquarters at Chicago, and in 1930 he was re-appointed general roadmaster, with the same headquarters. Mr. Donahoe was appointed division engineer, with headquarters at Bloomington, on January 1, 1932, and continued in that position until his retirement.

Maurice Donahoe

Charles W. Pitts, whose promotion to assistant to the chief engineer of the Union Pacific, with headquarters at Omaha, Neb., was announced in the January issue, was born at Hull, England, on March 9, 1888, and received his engineering education in that country. He entered railway service on June 2, 1910, as a chainman in the engineering department of the Oregon Short Line (a unit of the Union Pacific system), later serving as rodman, instrumentman and assistant engineer on construction, valuation and maintenance engineering work. On August 3, 1922, Mr. Pitts was transferred to the Union Pacific unit of the system and served as a draftsman, assistant engineer, roadmaster and division engineer until 1928, when he was appointed division engineer of the Central division. In February, 1931, that position was abolished and he served as roadmaster and as assistant engineer until April 16, 1935, when he was advanced to division engineer of the Colorado division, with headquarters at Denver, Colo., the position he held until his recent promotion.

Charles W. Pitts

Peter Victor Thelander, whose promotion to assistant engineer in the office of the engineer of maintenance of the Chicago & North Western at Chicago, was announced in the December issue, was born at Elgin, Ill., on March 9, 1892, and attended Armour Institute of Technology in 1910 and 1911 and the University of Illinois in 1912 and 1913. He first entered railway service in June, 1911, as a rodman on dam and tunnel construction on the Mt. Hood Railroad at Bull Run, Ore., resigning in September, 1912, to return to school. On June 16, 1913, he entered the service of the North Western as a rodman on construction and served at various points on construction and valuation work until November, 1916, when he went with the Chicago, Milwaukee, St. Paul & Pacific as an instrumentman in the valuation department at Chicago. On March 1, 1917, he went with the New York, Chicago & St. Louis as an assistant engineer in the valuation department at Cleveland, Ohio. During the first world war, Mr. Thelander served overseas with the 16th Engineers, returning to the North Western in May, 1919, as an instrumentman in the valuation department. In September, 1922, he was appointed instrumentman on the Galena division, and in October, 1926, he was promoted to assistant engineer on that division, the position he held until his recent promotion.

Fred W. Creedle, whose promotion to division engineer of the Sioux City and the North Iowa divisions of the Chicago & North Western, with headquarters at Sioux City, Iowa, was announced in the December issue, was born at Fulton, Ky., on July 20, 1900, and studied engineering at the University of Kentucky. He entered railway service in January, 1918, as an axeman on the location of the Edgewood cut-off of the Illinois Central at Fulton, returning to school in September, 1918, and later working during summer

vacations as a chainman and rodman on location, construction and maintenance in Mississippi, Tennessee, Kentucky and Illinois. Mr. Creedle began continuous service with the Illinois Central in September, 1922, as a rodman on the New Orleans Terminal division. In July, 1923, he was promoted to instrumentman on construction work in Mississippi and five months later he was transferred to East St. Louis, Ill., in connection with the rearrangement of the terminal facilities and the construction of a hump yard. On March 21, 1927, Mr. Creedle went with the Chicago & North Western as a draftsman in the general office at Chicago, and from May, 1930, to December, 1935, worked alternately as assistant engineer and engineering draftsman on track standards work for the engineer of maintenance. From December, 1935, to November, 1940, he worked as assistant engineer in the office of the engineer of maintenance on both office and special field work. His promotion to division engineer was effective December 1.

Robert J. Gammie, general roadmaster on the Texas & Pacific, with headquarters at Ft. Worth, Tex., has been promoted to engineer maintenance of way, with headquarters at Dallas, Tex., succeeding **R. H. Gaines,** who retired on January 1. **H. L. Bunn,** assistant engineer, with headquarters at Big Spring, Tex., has been appointed general roadmaster at Ft. Worth, relieving Mr. Gammie. Mr. Gammie was born at Arkansas City, Kan., on October 12, 1889, and graduated from Oklahoma A. & M. College in 1910. He entered railway service on September 15, 1910, as a rodman on the Kansas City Southern at Texarkana, Tex., later being promoted to instrumentman and assistant engineer. In March, 1915, he went into business for himself on bridge construction work in Chicago, and in November of that year he returned to railroad service as an instrumentman on the Chicago & Alton (now the Alton) at Bloomington, Ill. On January 1, 1916, he went with the Texas & Pacific as assistant engineer of valuation at Dallas. During the first World War he served overseas as a second and first

Robert J. Gammie

lieutenant with the 22nd Engineers on light railway construction, maintenance and operation, returning to the T. & P. in October 1919, as assistant roadmaster at Ranger, Tex. In March, 1920, he was appointed assistant engineer at Ft. Worth, Tex., and in July, 1921, he was advanced to general roadmaster, with headquarters at Marshall, Tex., later being transferred successively to Alexandria, La., and Ft. Worth.

Frederick W. Biltz, assistant to the general superintendent of the Reading, with headquarters at Reading, Pa., has been promoted to the newly-created position of engineer maintenance of way, with the same headquarters. Mr. Biltz was born on August 15, 1892, at Ashland, Pa., and was graduated from Lafayette college in 1917 with a degree in civil engineering. Immediately after his graduation, Mr. Bilts entered railway service with the Reading as a levelman in the office of the resident engineer at Philadelphia, Pa. In July, 1917, he was promoted to assistant supervisor of track, with headquarters at Tamaqua, Pa. Mr. Biltz entered military service in February, 1918, as a commissioned officer overseas in the railway transportation corps of the A. E. F. In July, 1919, he returned to the Reading as assistant supervisor of track at Tamaqua. In July, 1922, he was promoted to supervisor of track with headquarters at Olney,

Frederick W. Biltz

Pa. He was further promoted to assistant division engineer at Reading in September, 1934, and two years later he became assistant to the general superintendent, in which position his duties were concerned entirely with maintenance of way matters. His promotion to engineer maintenance of way became effective on January 16.

Henry W. Fenno, engineer maintenance of way on the New York Central lines west of Buffalo and the Ohio Central lines, with headquarters at Cleveland, Ohio, has retired, and **Lynn B. Holt,** engineer of track, with headquarters at Cleveland, has been appointed assistant district engineer, with the same headquarters. The positions of engineer maintenance of way and engineer of track at Cleveland have been abolished.

Mr. Fenno was born at Dorchester, Mass., on December 16, 1870, and was educated at Lowell Institute at Boston, Mass. He entered railway service in November, 1891, in the engineering department of the New York & New England (now a part of the New York, New Haven & Hartford). From January, 1893 to October, 1904, he was in the service of the Boston & Albany. In October, 1904, Mr. Fenno was appointed chief draftsman and office engineer on the Lake Shore & Michigan Southern (now a part of the New York Central) and in 1906 he was promoted to resident engineer of the Eastern

Henry W. Fenno

division, with headquarters at Dunkirk, N. Y. In February, 1913, he was transferred to the Western division, with headquarters at Chicago, and in March, 1916, the Illinois division was added to his territory. He was promoted to division engineer in 1917. Mr. Fenno was appointed engineer maintenance of way of the New York Central, west of Buffalo, with headquarters at Cleveland, Ohio, on November 1, 1927, and continued in that position until his retirement.

Thomas Lees, district engineer of the Alberta district of the Canadian Pacific, with headquarters at Calgary, Alta., has been transferred to the British Columbia district, with headquarters at Vancouver, B. C., succeeding **Frank Lee,** who retired on January 1.

Mr. Lee was born in Chicago on March 7, 1873, and attended the Sheffield Scientific School of Yale University. He entered railway service in 1894 as a rodman and draftsman on the location and construction of the Trinidad Government Railways at Trinidad, B. W. I. In May, 1896, he went with the Chicago & North Western as a rodman, later being promoted successively to instrumentman and assistant engineer. In September, 1901, he was appointed assistant signal engineer, and in November, 1902, he went with the Canadian Pacific as signal engineer. In January, 1904, he was appointed assistant division engineer at Calgary, Alta., and in August, 1904, he was appointed assistant engineer, Western lines, with headquarters at Winnipeg, Man. A year later Mr. Lee was appointed division engineer at Winnipeg and in April, 1912, he was advanced to principal assistant engineer at Winnipeg. He was promoted to engineer maintenance of way of the Eastern lines, with headquarters at Montreal, Que., in November, 1917, and was transferred to the Western lines, with headquarters at Winnipeg, in November, 1919. He was appointed district engineer of the British Columbia district in September, 1927.

George J. Adamson, district engineer of the Eastern district of the Union Pacific, has been appointed assistant chief engineer, with headquarters as before at Omaha, Neb., and **Lansing W. Althof,** di-

vision engineer of the Oregon division of the Union Pacific, with headquarters at Portland, Ore., has been promoted to district engineer of the Eastern district, succeeding Mr. Adamson. **Louis Frank Racine,** general roadmaster, with headquarters at Portland, Ore., has been appointed division engineer at that point, relieving Mr. Althof. **W. F. Hart,** general roadmaster of the Nebraska division, has been appointed division engineer, with headquarters as before at Omaha, replacing **R. M. Jolley,** who has been assigned to the staff of the chief engineer at Omaha.

Mr. Althof was born at Oakland, Cal., on July 31, 1886, and entered railway service in December, 1908, as a draftsman on the Southern Pacific, where he remained until October, 1910. In May, 1911, he became an assistant engineer on the Oregon Short Line (now part of the Union Pacific) and from that date until October, 1916, served in various capacities in the track and the bridge and building departments. From October, 1916, to February, 1918, he served in the maintenance of way department of the Union Pacific as assistant engineer on special investigation work and on construction. He left railway service in February, 1918, to become superintendent of hull construction for the Merchants Shipbuilding Corporation, where he remained until April, 1923, when he again entered railway service as assistant engineer on the Oregon Short Line. In April, 1925, Mr. Althof was promoted to division engineer of the Idaho division, with headquarters at Pocatello, Idaho, and in January, 1928, he was promoted to engineer maintenance of way of the Oregon Short Line, with the

Lansing W. Althof

same headquarters. In August, 1931, the position of engineer maintenance of way at Pocatello was abolished and he was appointed division engineer at that point. Mr. Althof was later transferred to Salt Lake City and then appointed roadmaster at Dillon, Mont. In April, 1935, he was promoted to division engineer at Portland.

Mr. Racine was born at Des Moines, Iowa, on August 29, 1890, and studied engineering at the University of Nevada. He entered railway service on the Union Pacific during the summer of 1907, serving summers between terms of school until 1915 as a chainman, rodman, instrumentman and levelman on location and construction work at various points. In June, 1915, he entered permanent service as an instrumentman on the Idaho division at Pocatello, Idaho, and on November 1, 1916, he was advanced to assistant engineer. Mr. Racine was promoted to assistant division engineer on October 1, 1918, appointed assistant engineer in July, 1920, and promoted to roadmaster at Ashton,

Louis Frank Racine

Idaho, on January 1, 1929. He was transferred to Glenn's Ferry, Idaho, on April 1, 1931, and promoted to general roadmaster, with headquarters at Portland, Ore., on May 15, 1939.

Track

Lyle Bristow, track supervisor on the New York Central (Big Four) at Harrisburg, Ill., has been transferred to Paris, Ill., succeeding **G. J. Nagel,** who retired on January 1, and **J. W. Vest,** assistant engineer on the Indiana division has been appointed track supervisor at Harrisburg, replacing Mr. Bristow.

S. H. Robb, assistant supervisor of track on the Pennsylvania, with headquarters at Carnegie, Pa., has been promoted to supervisor of track, with headquarters at Homestead, Pa., to succeed **G. A. Royce,** who has been transferred to Blairsville, Pa. **G. A. Godley,** assistant on the engineering corps, has been promoted to assistant supervisor of track at Mansfield, Ohio, to replace **J. J. Maher,** who has been transferred to Carnegie to replace Mr. Robb.

Thomas Robertson Alexander, whose promotion to roadmaster on the Canadian Pacific, with headquarters at Fernie, B. C., was announced in the December issue, was born at Calgary, Alta., on February 5, 1913, and graduated from the University of Manitoba in April 1935. He entered railway service in May, 1935, as a transitman on the Canadian Pacific at Nelson, B. C., and on April 30, 1939, he was transferred to Vancouver, B. C., where he was located until his recent promotion.

C. A. Wester, roadmaster on the Union Pacific at Portland, Ore., has been promoted to general roadmaster of the Oregon division, with the same headquarters, succeeding **Louis Frank Racine,** whose promotion to division engineer at Portland is announced elsewhere in these columns, and **John Foreman,** roadmaster at Grand Island, Neb., has been advanced to general roadmaster of the Nebraska division, with headquarters at Omaha, Neb., relieving **W. F. Hart,** whose appointment as division engineer at Omaha is announced elsewhere in these columns.

Charles E. Sundstrom, whose retirement as division roadmaster on the Great Northern, with headquarters at Minot, N. D., was announced in the January issue, was born on August 11, 1870, and entered railway service on the Great Northern on August 17, 1894, as a section laborer. He was promoted to section foreman in June, 1896, and to assistant roadmaster in August, 1905. Mr. Sundstrom was further advanced in August, 1914, to division roadmaster, with headquarters at Minot, N. D., the position he held until his retirement.

John Check, whose promotion to division roadmaster on the Great Northern, with headquarters at Minot, N. D., was announced in the January issue, was born in Germany on August 21, 1883, and entered railway service as a track laborer on the Great Northern in June, 1900. In March, 1903, he was promoted to section foreman, and on November 12, 1912, he was advanced to assistant roadmaster at Church's Ferry, N. D. In August, 1917, he was promoted to district roadmaster at Granville, N. D., and on May 19, 1919, he was transferred to a main line territory, with headquarters at Williston.

J. E. Crowley, whose promotion to supervisor of track on the Lehigh Valley, with headquarters at Towanda, Pa., was announced in the January issue, was born on March 3, 1902, at Farmington, N. Y., and entered railway service with the Lehigh Valley in 1918. He served as assistant track foreman and track foreman at Victor, N. Y., and Jersey City and South Plainfield, N. J., until March 1, 1940, when he was promoted to assistant supervisor of track.

Malcolm Young, Jr., whose promotion to supervisor of track on the Pennsylvania, with headquarters at Cadillac, Mich., was announced in the December issue, was born at Portland, Ore., on September 11, 1911, and attended Yale University. He entered railway service in June, 1934, with the Long Island Railroad (subsidiary of the Pennsylvania) at Jamaica, N. Y., and in 1935 he was appointed assistant on the engineer corps of the Pennsylvania at New Brunswick, N. J. In 1936 he was promoted to assistant supervisor at York, Pa., and was transferred to Trafford, Pa., in 1937 and to Jersey City, N. J. in 1940, being located at the latter point until his recent promotion.

Arthur J. Johnson, whose promotion to roadmaster on the Chicago & North Western, with headquarters at Redfield, S.D., was announced in the January issue, was born at Charlotte, Iowa, on July 28, 1904, and entered railway service on March 13 1920, as a section laborer at Clinton, Iowa. He was promoted to assistant foreman on February 1, 1925, and on May 1, 1926, he was advanced to yard foreman and extra gang foreman at Clinton. Mr. Johnson was further advanced to assistant roadmaster at Chicago on June 1, 1939, the position he held until his recent promotion on January 1.

Thomas Henry Smith, whose promotion to track supervisor on the Louisville & Nashville, with headquarters at Russellville, Ky., was announced in the December issue, was born at Hartford, Ky., on August 22, 1892, and took a correspondence course in civil engineering. He entered railway service on August 13, 1908, as a section laborer on the L. & N., and on October 1, 1911, he was promoted to apprentice foreman. Mr. Smith was advanced to section foreman on December 1, 1914, and to extra gang foreman on January 16, 1937, the position he held at the time of his recent promotion. All of his service has been on the H. D. & S. divisions of the L. & N.

R. L. Samuel has been appointed track supervisor on the Louisville & Nashville at Latonia, Ky., succeeding **T. D. Williams,** whose promotion to assistant trainmaster at Hazard, Ky., was announced in the January issue. **T. H. Smith,** track supervisor at Russellville, Ky., has been transferred to the Nashville Terminals at Nashville, Tenn., replacing **F. A. Cloud,** whose appointment as assistant engineer is announced elsewhere in these columns. **R. A. Kemper,** extra gang foreman on the Evansville division, has been promoted to track supervisor at Russellville, relieving Mr. Smith.

Charles Hamilton Johnston, whose retirement as roadmaster on the Canadian Pacific, with headquarters at Brandon, Man., was announced in the December issue, was born at Clinton, Ont., on September 20, 1875, and entered railway service on May 1 1901, as a section laborer on the Canadian Pacific in Manitoba later serving as relieving roadmaster on the Manitoba district for several years. On July 1, 1920, he was promoted to roadmaster at Lethbridge, Alta., and was transferred to Brandon, Man., on May 15, 1922. Mr. Johnston was transferred to Minnedosa, Man., on July 1, 1931, and was transferred back to Brandon on July 1, 1935, where he was located until his retirement.

R. B. Melton, assistant bridge and building supervisor of the San Antonio division of the Southern Pacific, with headquarters at San Antonio, Tex., has been promoted to roadmaster, with headquarters at El Paso, Tex., succeeding **P. P. Marion,** who retired on January 1. Mr. Marion was born at Castroville, Tex., on December 21, 1874, and entered railway service in 1895 as a track walker on the Galveston, Harrisburg & San Antonio (now part of the Southern Pacific system) at Devils River, Tex. The following year he was promoted to section foreman, serving at various points on the El Paso division until September, 1922, when he was promoted to roadmaster of the El Paso district, which position he held until his retirement.

David E. Cowell, a transitman in the office of the resident engineer of the Reading at Philadelphia, Pa., has been promoted to assistant supervisor of track in the office of the division engineer at Tamaqua, Pa., where he succeeds **C. Gehret Deppen,** who has been transferred to Pottstown, Pa. Mr. Deppen replaces **Robert S. Newhall,** who holds a commission in the United States Naval Reserve and who has been furloughed to permit him to enter active service. **James B. Wright,** assistant supervisor of track on the staff of the general manager, with headquarters at Reading, Pa., has resigned, effective December 31, 1940, to accept a position in the maintenance of way department of the Lehigh & Hudson River.

John H. Welshinger, whose promotion to roadmaster on the Northern Pacific, with headquarters at Pasco, Wash., was announced in the December issue, was born at Mahtowa, Minn., on November 25, 1882, and entered railway service on April 15, 1898, with the St. Paul & Duluth (now part of the Northern Pacific) as a track laborer. In August 1900, he was promoted to section foreman and served at various locations on the Lake Superior division as a section and extra gang foreman until June, 1917, when he was promoted to roadmaster at Duluth, Minn. In October, 1932, he was appointed a track supervisor and served in that capacity and as assistant roadmaster in charge of system rail-laying gangs on various divisions, until his recent promotion to roadmaster at Pasco.

Jack Thomas Stotler, whose promotion to division roadmaster on the Northern Pacific, with headquarters at Spokane, Wash., was announced in the December issue, was born at Tacoma, Wash., on May 27, 1905 and graduated in mechanical engineering from Washington State College in 1928. He entered railway service in September, 1928, in the engineering department of the Northern Pacific, serving on the Tacoma and Idaho divisions. In 1933 he was appointed assistant supervisor of maintenance on the Camas Prairie Railroad (jointly controlled by the Union Pacific and the Northern Pacific), with headquarters at Lewiston, Idaho, and in 1935 he was appointed roadmaster on the Northern Pacific, with headquarters at Helena, Mont. Mr. Stotler was transferred to Lester, Wash., in 1937, where he was located until his recent promotion.

Bridge and Building

B. M. Merrill, assistant supervisor of bridges and buildings on the New York, Chicago & St. Louis (Nickel Plate) at Conneaut, Ohio, has been promoted to supervisor of bridges and buildings, with the same headquarters, succeeding **H. L. Koch,** who retired on January 1, and **R. W. Oakes** has been appointed assistant supervisor of bridges and buildings at Conneaut, replacing Mr. Merrill.

Frank William Welbourn, whose promotion to bridge and building master on the Canadian Pacific, with headquarters at Moose Jaw, Sask., was announced in the January issue, was born at Weston, St. Marys' England, on October 9, 1889, and engaged in railway construction work in Manitoba and Saskatchewan in 1908, and in railway construction work and lumbering in Minnesota in 1909. In 1910 he entered the service of the Canadian Pacific in the bridge and building department at Winnipeg, and in 1911 and 1912 he engaged in telephone construction work in Saskatchewan. Mr. Welbourn returned to the Canadian Pacific on November 22, 1912, and was later promoted to bridge and building foreman.

Obituary

William S. Francis, roadmaster on the St. Louis Southwestern, with headquarters at Dallas, Tex., died on December 20, after a month's illness.

Owen Crawford, division engineer of the Nashville Terminals of the Louisville & Nashville, with headquarters at Nashville, Tenn., died on January 9.

Robert Anderson Rutledge, at one time chief engineer of the Eastern lines of the Atchison, Topeka & Santa Fe, who retired in 1933 as district engineer of the Western lines, with headquarters at Amarillo, Tex., died on January 5 at Lawrence, Kan.

George Stokes Fanning, chief engineer of the Erie and president of the American Railway Engineering Association, died of coronary thrombosis on January 2 at

George S. Fanning

Cleveland, Ohio. Mr. Fanning has been active in the affairs of the A.R.E.A. for many years, having served as committee chairman, vice-president and a member of the Board of Direction previous to his election as president of that association in March, 1940.

Mr. Fanning was born at Detroit, Mich., on April 25, 1885, and graduated in civil engineering from the University of Michigan in 1906. He entered railroad service the same year as a rodman on the Michigan Central and the following year became an instrumentman for the Detroit River Tunnel Company (a subsidiary of the Michigan Central), later being promoted to assistant engineer. In 1910 Mr. Fanning went with the Algoma Central & Hudson Bay as a resident engineer and in 1913 he became a resident engineer on the Erie at Meadville, Pa., later serving as estimating engineer and chief draftsman at New York. On June 1, 1918, he was advanced to assistant to the chief engineer and on March 1, 1920, he was made office engineer. Mr. Fanning was further advanced to principal assistant engineer on May 1, 1925, to assistant chief engineer on February 15, 1927, and to chief engineer, with headquarters at New York, on June 16, 1929. His headquarters were later transferred to Cleveland.

(Continued on page 112)

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Association News

Metropolitan Maintenance of Way Club

The next meeting of the club will be held at the Hotel Governor Clinton, New York, on February 27 instead of February 13, as previously announced. Following dinner, which will be served at 6:30, the meeting will be addressed by P. O. Ferris, chief engineer of the Delaware & Hudson, who will describe the experiences of his company with the maintenance of continuous butt-welded rail. As an additional feature of the program, a number of moving pictures showing methods of butt-welding rail will be exhibited, following Mr. Ferris' address.

Maintenance of Way Club of Chicago

One hundred and twenty-eight members and guests were in attendance at the meeting on January 27, which was addressed by A. E. Perlman, engineer maintenance of way of the Denver & Rio Grande Western on Getting the Most Out of Work Equipment. Interspersing his remarks with a large number of lantern slides of equipment in action, Mr. Perlman stressed in particular the large advantages and economies which are being effected on his road through the use of off-track units. The program was closed with the showing of a motion picture of highly mechanized rail-laying operations on the D. & R. G. W.

The next meeting of the club, on February 24, will be addressed by W. S. Hanley, chief engineer of the St. Louis Southwestern, on Stabilizing Track Through Subdrainage.

American Railway Engineering Association

Following the death of Geo. S. Fanning, chief engineer of the Erie, and president of the Association, on January 2, F. L. C. Bond, vice-president and general manager of the Central region of the Canadian National, and senior vice-president of the Association, has assumed the duties of president and plans are going forward for the annual convention to be held in Chicago, March 11-13. With the work of the various committees prior to the convention practically completed, only one committee met during January, and only one committee has scheduled a meeting during February. The Committee on Economics of Railway Location and Operation met at Cincinnati, Ohio, on January 30 and 31, while the Committee on Iron and Steel Structures will meet at Chicago on February 13 and 14.

Late in January, Bulletin No. 422 was mailed to members, this bulletin including the reports of the committees on Wood Bridges and Trestles, Masonry, Waterproofing of Railway Structures, Iron and Steel Structures, Records and Accounts, and Impact. Bulletin No. 423 is now being prepared for the printer, and will be mailed to members about the middle of February.

Ballots for the election of officers and directors of the Association, in accordance with the nominations reported in the January issue of *Railway Engineering and Maintenance*, have been printed and will be mailed to members just after February 1.

Bridge and Building Association

The Executive committee has selected the following members to serve on committees charged with responsibility for studying and reporting on subjects at the next convention, as follows:

No. 1—Possibilities of Off-Track Equipment in Bridge Construction and Maintenance. H. T. Livingston (chairman), engr. brdgs., C. R. I. & P., Chicago; D. T. Rintoul (vice-chairman), gen. brdg. insp., S. P., San Francisco, Cal.; Van S. Brokaw, asst. engr., C. M. St. P. & P., Chicago; R. W. Cassidy, asst. cost engr., C. & O., Richmond, Va.; M. H. Dick, eastern editor, *Railway Engineering and Maintenance*, New York; Carl Djuvik, supv. brdgs., Tenn. Cent., Nashville, Tenn.; J. M. Giles, supv. b. & b., M. P., St. Louis, Mo.; F. W. Hillman, asst. engr. m. w., C. & N. W., Chicago; J. L. Holmes, supv. b. & b., S. P., Falls City, Neb.; A. S. Krefting, prin. asst. engr., M. St. P. & S. S. M., Minneapolis, Minn.; G. A. Linn, asst. supv. b. & b., C. & N. W.; C. D. Mallory, b. & b. fore., M. P., Piedmont, Mo.; F. S. Spofford, supv. b. & b., B. & M., Boston, Mass.; L. A. Warren, supv. b. & b., S. P., Sacramento, Cal.; B. M. Whitehouse, gen. brdg. insp., C. & N. W., Chicago; M. H. Williams, engr. draftsman, D. & H., Carbondale, Pa.

No. 2—Maintenance and Repair of Bridge and Building Equipment. Martin Meyer (chairman), supv. b. & b., C. & W. I., Chicago; F. E. Taggart (vice-chairman), asst. engr., I. C., Chicago; W. A. Batey, system brdg. insp., U. P., Omaha, Neb.; J. H. Brandt, supv. b. & b., C. & O., Columbus, Ohio; W. W. Caines, brdg. insp., C. & O., St. Albans, W. Va.; J. J. Clutz, div. engr., Penna., Indianapolis, Ind.; D. W. Converse, asst. engr., A. C. & Y., Akron, Ohio; R. W. Cook, gen. brdg. insp., S. A. L., Norfolk, Va.; H. E. Davis, brdg. insp., N. Y. C., Chicago; R. W. Johnson, asst. engr., C. M. St. P. & P., Chicago; S. H. Knight, supv. work equip., N. P., St. Paul, Minn.; C. Kohler, supv. b. & b., Erie, Cleveland, Ohio; W. K. Manning, gen. brdg. fore., Erie., Cleveland, Ohio; A. Monson, supv., N. P., Glendive, Mont.; A. J. Moore, brdg. insp., M. P., Eunice, La.

No. 3—Protection of Bridges and Roadway from River Bank Erosion. A. B. Chapman (chairman), office engr., C. M. St. P. & P., Chicago; R. E. Caudle (vice-chairman), asst. engr., M. P., Houston, Tex.; E. M. McCabe (vice-chairman), supv. b. & b., B. & A., Pittsfield, Mass.; G. A. Allen, brdg. insp., C. & O., Clifton Forge, Va.; W. L. Baker, brdg. insp., C. & E. I., Salem, Ill.; M. Bear, estimator, C. & N. W., Chicago; J. E. Bird, b. & b. insp., N. Y. C., Corning, N. Y.; N. Buckley, brdg. insp., M. P., Palestine, Tex.; B. J. Chamberlin, asst. on engr. corps, C. & E. I.; A. R. Harris, office engr., C. & N. W.; J. E. Hogan, asst. div. engr., C. & O., Hinton, W. Va.; N. D. Howard, managing editor, *Railway Engineering and Maintenance*, Chicago; W. G. Kemmer, asst. engr., Penna., Chicago; A. A. Sirel, engr. draftsman, C. & N. W., Chicago; J. S. Vreeland, associate editor, *Railway Engineering and Maintenance*, Chicago; C. H. Wells, div. engr., C. & N. W., Boone, Iowa; W. E. White, gen. fore. b. & b., A. T. & S. F., Chanute, Kan.

No. 4—Welding in Water Service. J. P. Hanley (chairman), water service insp., I. C., Chicago; G. S. Crites (vice-chairman), div. engr., B. & O., Punxsutawney, Pa.; M. A. Bost, asst. engr., C. M. St. P. & P., Mason City, Iowa; J. Cole, fore. w. s., C.N.R., Toronto, Ont.; L. A. Cowsert, water insp., B. & O., Dayton, Ohio; C. E. Crippen, fuel insp., C. M. St. P. & P., Chicago; L. D. Garis, asst. gen. brdg. insp., C. & N. W., Chicago; F. M. Gunter, fore. w. s., Alton, Bloomington, Ill.; J. A. Jorlett, asst. master carp., Penna., Jersey City, N. J.; W. Liechti, engr. draftsman, C. & N. W., Chicago; J. H. McClure, b. & b. master, C.N.R., Moncton, N. B.; K. L. Miner, supv. b. & b., N. Y. C., Beacon, N. Y.; R. T. Rumboldt, supv. b. & b., Southern, Greensboro, N. C.; T. J. Sheehy, supv. w. s. & p., D. & H., Plattsburg, N. Y.; G. L. Summers, w. s. repairman, M. P., Bismark, Mo.; J. L. Varker, supv. b. & b., D. & H., Carbondale, Pa.; M. P. Walden, asst. supv. b. & b., L. & N., Evansville, Ind.; W. L. Wallace, supv. w. s., P. M., Saginaw, Mich.; K. J. Weir, spl. water insp., C. M. St. P. & P., Chicago.

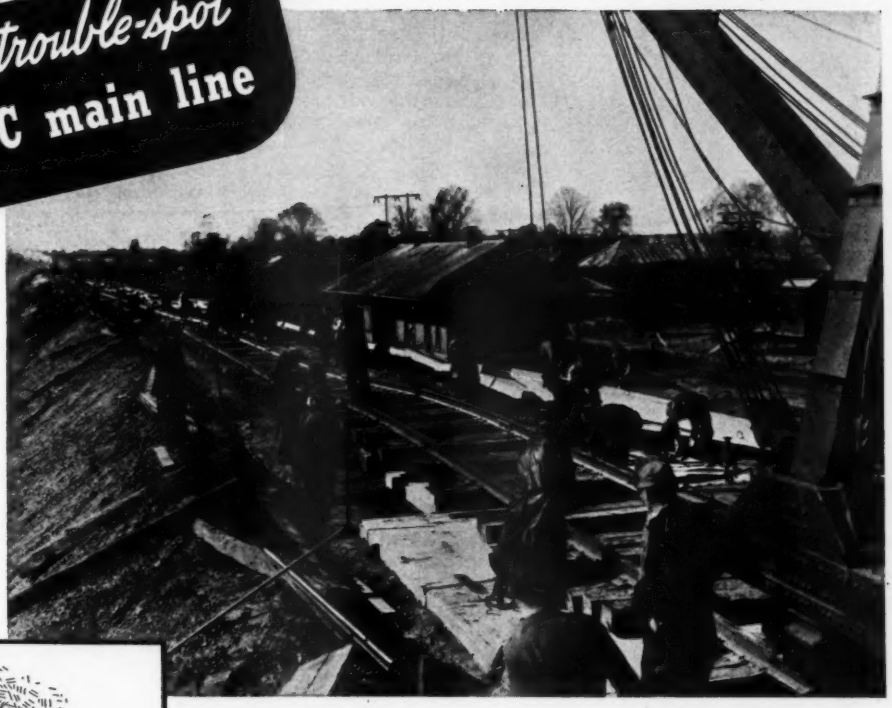
No. 5—Wearing Surfaces for Buildings, Floors, Platforms and Roadways. E. L. Rankin (chairman), architect, G. C. & S. F., Galveston, Tex.; C. S. Weatherill (vice-chairman), chf. engr., M. & St. L., Minneapolis, Minn.; W. L. Anderson, engr. draftsman, C. & N. W., Chicago; C. M. Burpee, managing editor, *Railway Engineering and Maintenance Cyclopedia*, Chicago; F. W. Hutcheson, asst. supv. b. & b., C. & O., Newport News, Va.; H. W. Jenkins, asst. supv. b. & b., N. Y. N. H. & H., Boston, Mass.; P. L. Koehler, div. engr., C. & O., Ashland, Ky.; F. H. Masters, chf. engr., E. J. & E., Joliet, Ill.; L. R. Morgan, transitman, N. Y. C., Syracuse, N. Y.; W. V. Parker, constr. engr., Memphis, Tenn.; R. D. Ransom, supv. b. & b., C. & N. W., Madison, Wis.; C. A. J. Richards, master carp., Penna., Chicago; C. U. Smith, gen. mgr. & chf. engr., Harbor Comm., Milwaukee, Wis.; M. Stein, engr. draftsman, C. & N. W., Chicago; T. H. Strate, div. engr., C. M. St. P. & P., Chicago; W. Walkden, brdg. engr., C.N.R., Winnipeg, Man.; H. O. Wray, engr. m. w. & s., Texas City Term., Texas City, Tex.

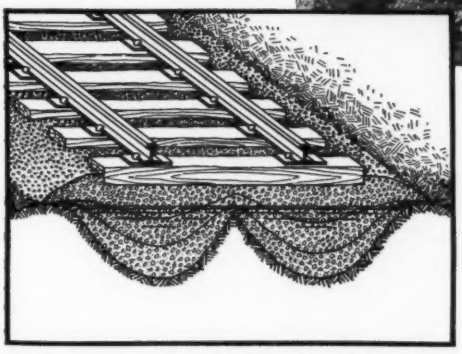
No. 6—Modernizing Small Stations to Meet Present Day Requirements. L. C. Winkelhaus (chairman), arch. engr., C. & N. W., Chicago; W. A. Hutcheson (vice-chairman), supv. b. & b., C. & O., Clifton Forge, Va.; L. E. Peyser (vice-chairman), asst. arch., S. P., San Francisco, Cal.; C. F. Berg, engr. draftsman, C. & N. W., Chicago; P. B. Collier, asst. supv. b. & b., M. P., Monroe, La.; H. M. Harlow, asst. supv. b. & b., C. & O., Clifton Forge, Va.; D. H. Johnson, supv. b. & b., C. St. P. M. & O., St. Paul, Minn.; W. W. Kerr, asst. engr., C. & N. W., Chicago; T. S. McMahon, architect, G. N., St. Paul, Minn.; J. A. Moore, supv. b. & b., C. & E. I., Danville, Ill.; A. W. Nelson, asst. engr., C. M. & St. P. & P., Chicago; F. A. Scites, supv. b. & b., C. & O., Huntington, W. Va.; J. W. Secker, bldg. insp., C. M. St. P. & P., Chicago; W. V. Sweet, gen. fore. b. & b., A. T. & S. F., Newton, Kan.

No. 7—Efficient Methods of Transporting

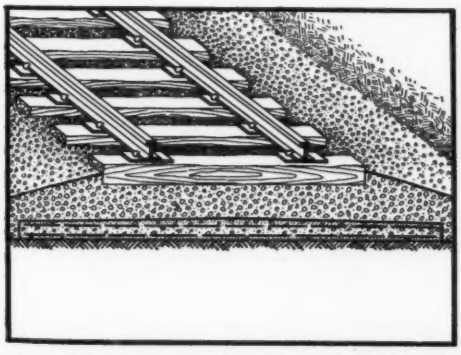
Continued on page 114

CONCRETE cured this *trouble-spot* on the I-C main line





Before: Ballast sank into the fill, and side slopes were unstable under the pounding of traffic.



After: Precast concrete slabs 14 ft. long by 10 ft. wide by 8 in. thick now spread the load over a wider area and prevent trouble. Train speeds have gone up and maintenance has gone down.

A HIGH fill for the Illinois Central track at the west approach to the Vicksburg, Miss., bridge was completed in 1930—and then the trouble began!

The underlying material—largely gumbo and river silt—developed water pockets and refused to respond to ordinary methods of stabilization. Thousands of yards of additional filling material and thousands of yards of ballast failed to do the job.

Concrete Carries the Load

After eight years of high maintenance, the railroad decided to place precast concrete slabs under the track. In three days, without interrupting traffic, slabs for the entire 2,261 feet of the approach were placed.

L. H. Bond, chief engineer, maintenance of way, states: "Originally, we had to give attention to the line and surface two or three times a week. Now, after two years on the slabs, we have given it practically no attention."

There's a suitable type of concrete track support—sub-ballast slabs, pressure-grouted sub-ballast or concrete embedded ties—that will save money on your "trouble spot."

Write for *"Concrete Supported Railway Track,"* giving technical data on various types of concrete track support.

PORTLAND CEMENT ASSOCIATION

Dept. A2-27, 33 W. Grand Ave., Chicago, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

Bridge and Building and Water Service Gangs. S. S. Long (chairman), div. engr., C. & N. W., Escanaba, Mich.; A. D. Gillis (vice-chairman), supv. b. & b., N. Y. N. H. & H., Providence, R. I.; H. T. Bishop, asst. supv. b. & b., C. & O., Richmond, Va.; J. H. Brandt, supv. b. & b., C. & O., Columbus, Ohio; L. G. Byrd, supv. b. & b., M. P., Poplar Bluff, Mo.; A. Chinn, chf. engr., Alton, Chicago; R. A. M. Deal, supv. b. & b., Southern, Richmond, Va.; A. M. Glander, chf. carp., C. M. St. P. & P., Mason City, Iowa; R. E. James, supv. b. & b., L. V., Roselle Park, N. J.; A. C. Jones, supv. b. & b., Southern, Parrish, Ala.; C. R. Knowles, supt. w. s., I. C., Chicago; H. M. Mason, gen. fore., A. T. & S. F., Pueblo, Colo.; J. R. Penhallegon, supv. b. & b., C. & N. W., Chicago; J. M. Salmon, Jr., asst. supv. b. & b., L. & N., Louisville, Ky.; G. L. Sitton, chf. engr. m. w. & s., Southern, Charlotte, N. C.; E. E. Tanner, gen. supv. b. & b., N. Y. C., Albany, N. Y.; M. G. Tribe, master carp., Erie, Salamanca, N. Y.

No. 8—Recent Developments in Paint Removal. C. M. Burpee (chairman), managing editor, *Railway Engineering and Maintenance Cyclopedia*, Chicago; T. M. Von Sprecken (vice-chairman), engr. brdgs., Southern, Cincinnati, Ohio; R. C. Baker, supv. scales, C. & E. I., Danville, Ill.; A. E. Bechtelheimer, asst. engr. brdgs., C. & N. W., Chicago; G. W. Benson, supv. b. & b., C. of Ga., Macon, Ga.; H. M. Buell, brdg. insp., U. P., Omaha, Neb.; F. G. Campbell, asst. chf. engr., E. J. & E., Joliet, Ill.; J. E. Heck, brdg. insp., C. & O., Peru, Ind.; T. E. Jackson, supv. b. & b., S. P., Tucson, Ariz.; S. E. Kwenberg, asst. engr., C. M. St. P. & P., Chicago; L. E. Laurent, asst. engr., Erie, Cleveland, Ohio; E. C. Neville, b. & b. master, C.N.R., Toronto, Ont.; A. M. Partch, supv. b. & b., N. P., Pasco, Wash.; R. A. Whiteford, div. engr., C. M. St. P. & P., Ottumwa, Iowa; J. J. Wishart, b. & b. supv., N. Y. N. H. & H., New Haven, Conn.; J. F. Zanilio, master carp., D. & R. G. W., Alamosa, Colo.

Supply Trade News

General

The Nichols Engineering Company, Chicago, has been organized to take over **Geo. P. Nichols & Bros., Inc.,** without change in personnel.

The Timber Engineering Company of Georgia and Alabama has been formed by Maxwell & Hitchcock, Georgia engineers, to specialize in the sale of the Teco system of timber construction for use in warehouse roof truss construction, railway structures and bridges, etc.

Personal

Leonard S. Parker, superintendent of production for Skilsaw, Inc., Chicago, has been elected vice-president in charge of operations. Mr. Parker has been associated with Skilsaw, Inc., since 1931.

J. H. Schermerhorn has been elected president of the **Joseph Dixon Crucible Company,** Jersey City, N.J., succeeding **George T. Smith,** whose death on December 20 is announced elsewhere in these columns.

M. C. Bellamy, sales engineer for the **Timken Roller Bearing Company** at Seattle, Wash., has been promoted to district manager of industrial bearing and steel sales for the Seattle territory.

Harry J. Schultz, formerly manager of the contractors division of the **Independent Pneumatic Tool Company,** has been appointed central regional manager of the construction equipment division of the **Worthington Pump and Machinery Corporation,** with headquarters at Chicago.

Grant B. Shipley, chairman and a director of the **Wood Preserving Corporation,** Pittsburgh, Pa., has sold his interest in this company to the Koppers Company, which will operate the Wood Preserving Corporation as one of its divisions.

Mr. Shipley was born at Coulterville, Cal., on April 27, 1880, and served as a

Grant B. Shipley

machinist apprentice in a general repair shop, draftsman, machine designer and chief draftsman. In 1905 he entered the employ of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., and during the next six years was chief draftsman and later chief engineer in charge of drawing, designing and constructing mining and timber preserving plants. From 1911 to 1932 he has been associated, as an executive and operating officer, with various tie, coal and timber treating companies and has also been a practicing, designing and consulting engineer for timber treating and other plants.

After leaving the employ of Allis-Chalmers, he organized the Pittsburgh Wood Preserving Company, occupying the position of president. In 1923 he organized the Century Wood Preserving Company as president, and in October, 1930, became associated with the Koppers Company in organizing the Wood Preserving Corporation to consolidate and co-ordinate the 22 timber treating plants of the Ayer & Lord Tie Company, Chicago, the National Lumber & Creosoting Company, Texarkana, Tex., and the Century Wood Preserving Company. At that time Mr. Shipley was also made president of the Wood Preserving Corporation and the National Lumber & Creosoting Company. In September, 1933, he was elected chairman of the board of the Wood Preserving Corporation. In 1922, Mr. Shipley also became associated with the American Nickel Corporation (later the American Mond Nickel Company) as president and chairman, at which time he was also made a director of the Mond Nickel Company of England and a member of its executive committee in Canada. When the Mond interests were taken over by the International Nickel Company, Ltd., of Canada in 1929, he was elected a director and a member of the executive committee of the latter company. Mr. Shipley is still associated with Koppers Company of Pittsburgh as a consultant.

Obituary

George T. Smith, president of the Joseph Dixon Crucible Company, Jersey City, N.J., died December 20, after a brief illness.

LeBaron Turner, president of the U. S. Wind Engine & Pump Company, Batavia, Ill., died on January 21 of a heart ailment.

Trade Publications

Air Compressors — The Worthington Pump & Machinery Corporation, Harrison, N.J., has issued a six-page illustrated folder devoted to this company's types VA and VA2 balanced-angle, two-cylinder air compressors.

Mixed Flow Pumps.—Fairbanks, Morse & Co., Chicago, has published bulletin 6360, a folder describing a new line of mixed flow propellor pumps, which range in sizes up to approximately 60,000 gal. per min. and heads up to 40 ft. The folder explains in detail the construction and operating features of the various parts of the pumps and is attractively illustrated.

Handbook of Building Maintenance.—A fourth edition of the Handbook of Building Maintenance, completely revised, has been published by the Flexrock Company, Philadelphia, Pa. In addition to general information pertaining to the maintenance of buildings, the handbook contains complete data regarding the advantages and uses of this company's products, which include floor repair and finishing materials, concrete admixtures for various purposes, compounds for hardening concrete surfaces, roofing materials and caulking compounds. The 70 pages of the handbook contain more than one hundred fifty photographs and drawings.

Pressure-Creosoted Poles.—A 20-page booklet, Form G-15, has been published by the Wood Preserving Corporation, Pittsburgh, Pa. (a Koppers Company subsidiary), which describes the production of creosoted poles and discusses the comparative costs and life of treated and untreated poles. The booklet presents specifications for pole quality, before treatment, of Southern Yellow Pine poles, for creosote, and for the treatment, penetration and inspection of treated Southern Yellow Pine poles. Also presented are tables of weights, equivalent diameters, breaking loads, ultimate fibre stresses and recommended depths of embedment; and suggestions for unloading and field treatment. The booklet is attractively illustrated with photographs.

Practical Books That Will Help Maintenance Men Do Better Work

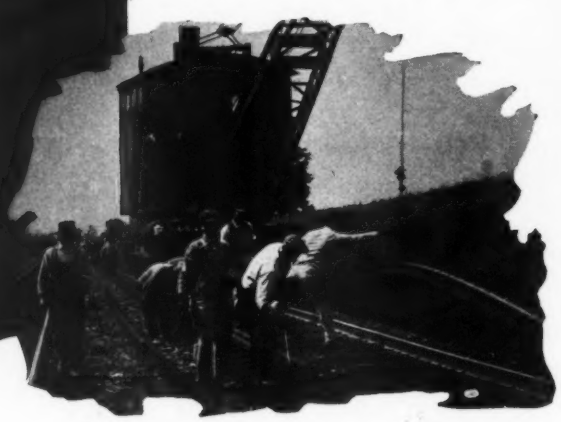
Roadway and Track

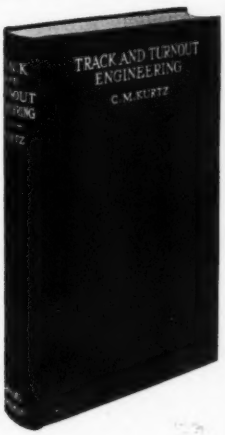
By W. F. RENCH

Formerly Supervisor on the Pennsylvania

A valuable compilation of practical information on the solution of problems of construction and maintenance of roadbed and track. The practice described is largely that of the *Pennsylvania*, but methods adopted as standard on other roads are also given. Drawings and photographs supplement the text and there is a complete index.

Second edition, 226 pages, 44 illustrations, cloth, 6x9, $2.00





Track and Turnout Engineering

By C. M. KURTZ

Engineer, Southern Pacific Company

This handbook for location, construction and maintenance of way engineers, transitmen and draftsmen, gives practical mathematical treatment of track layout and other problems. These are fully exemplified and worked out in detail, and illustrated with drawings of accepted designs for fixtures and track layouts. It contains original as well as a complete set of standard railway engineering handbook tables. All computing problems which may arise in track engineering are thoroughly treated by an engineer of 25 years' experience. 457 pages, 116 illustrations, 33 tables, flexible binding, 5x7 inches, $5.00.

Simplified Curve and Switch Work

By W. F. RENCH

This little book has practically revolutionized curve and switch calculation practice since its appearance 15 years ago. The proved accuracy of its methods has caused them to be adopted as standard practice on many roads.

Complex algebraic and geometric calculations are reduced to their simplest form and as nearly as possible to terms of simple arithmetic. Application of these calculations to the actual job is made plain by brief explanations. Drawings further clarify the subject and make the meaning of the text unmistakable. Short cut formulae are featured. String lining and tape line layouts are fully explained. 212 pages, 24 illustrations, 5x7, cloth, $2.00.

CARE AND OPERATION OF TRACK MOTOR CARS

By C. R. KNOWLES

In charge of Operation and Maintenance of Motor Cars, Illinois Central System

A reprint of a series of articles on the design, use and care of motor cars which appeared in "Railway Engineering and Maintenance." Full of practical information of value to maintenance men having charge of this type of equipment. 66 pages, 30 illus., 9 x 12, paper, $.25.

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( ) Track and Turnout Engineering, $5 ( ) Roadway and Track, $2.00
( ) Simplified Curve and Switch Work, $2 ( ) Care and Operation of Track Motor Cars, $.25.

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(Sent on approval to retail purchasers in U. S. only.) REM-2-41

HOW TO AVOID TIME-WASTING "Slow orders" DURING CULVERT INSTALLATIONS

NO SLOW ORDERS were necessary when these two 66" culverts of U·S·S Pure Iron were jacked under the Milwaukee Railroad near West Salem, Wisconsin. Installation by Young and Greenawalt.

POOR drainage is a frequent cause of "slow orders." Water collects under the roadbed. Sometimes it makes a "soft track." Or it may freeze, causing the track to heave. In either case, trains must slow down.

Drastic reductions in speed are costly in high-speed train service. Time lost in reducing the speed of a modern train from 85 m.p.h. to 20, then back to 85 again may run as much as 6½ minutes on level track.* Excessive bursts of speed to make up this time often cause damage to the rails.

These conditions can usually be avoided by installing adequate drainage. Culverts made of U·S·S Galvanized Copper Steel or Pure Iron can be jacked through the roadbed without slowing down a train. The two culvert installations shown here are both under high-speed main lines. If sufficient culverts are used, track maintenance can be greatly reduced.

REPLACING an old masonry culvert by jacking in a new galvanized culvert 60 feet long. Made of 10-gauge U·S·S Pure Iron 36" in diameter. Installed by Eastern Culvert Co.

U·S·S Culverts can be obtained in all parts of the country. We'll gladly give you the name of the fabricators serving your territory. They can supply ordinary culverts or heavy sectional plates for small bridges.

*Taken from an article in the October, 1940, Railway Engineering and Maintenance.

U·S·S GALVANIZED CULVERT SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
Scully Steel Products Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

USS

UNITED STATES STEEL

TO RAILWAY SUPPLY MANUFACTURERS

"He Can't Get In"

"Boss, these railway officers are certainly busy these days."

"That's good news, Bill. I suppose they're getting ready to spend some of the increased earnings that they see coming from the pick-up in National Defense traffic."

"In a way, yes, Boss, but it's even more to keep ahead of the demands on their tracks and structures that they know are going to develop this summer. They know we just can't tolerate delays when we're preparing for war."

"That's right. Are you getting *our* story across to these men?"

"I'm trying to, Boss, but it's getting tougher all the time."

"What's the matter?"

"They're out on the line more than half the time. And it doesn't do much good to wait till they come in."

"Why not?"

"They're too busy to see me when they get in. They're in one conference after another with their 'brass hats' or they've called their men in to go over the details of work to be done. And when I do get in, they can give me only a few minutes."

"That's tough."

"I'll say it is. It's certainly different from what it's been the last few years. I'm puzzled to know what to do."

"That ought to be obvious, Bill."

"What do you mean, Boss?"

"Just this. The men you want to see are either out on the line or too busy to see you."

"That's right."

"But they still read, Bill—at home, on the line and maybe a little in the office. They've got to know what's new now more than ever."

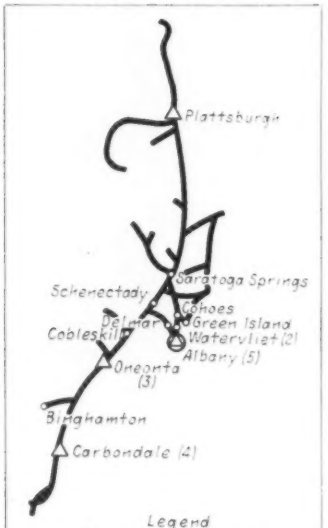
"That's right. But what's that got to do with my being unable to see them."

"A lot, Bill. Don't you see that this is a 'natural' for advertising. They're reading *Railway Engineering and Maintenance* more closely than ever. So we've got to increase our space in that magazine to keep before these men the story that you are unable to get to them through personal contacts."

"That sounds reasonable. And what's more, Boss, when they want some information in a hurry they can get it from our advertisements without waiting till I get back from a trip."

"That's true, too."

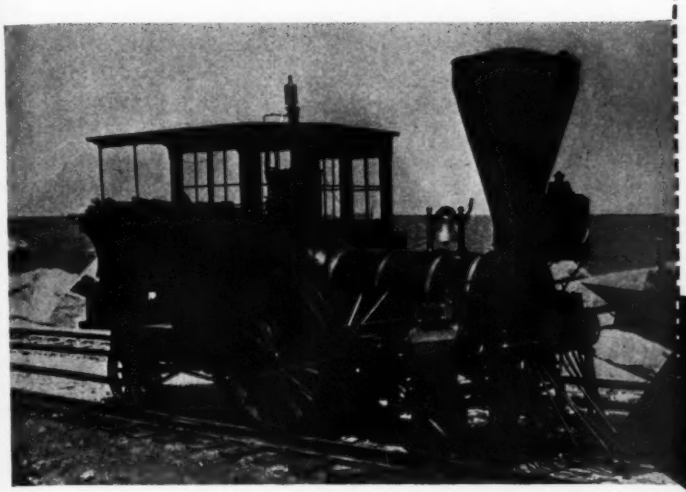
"Boss, you've got a good head on you. With that advertising I'll be able to double my business this year."



Delaware & Hudson

Railway Engineering and Maintenance Goes Every Month to 22 Supervisory Maintenance Officers of the Delaware & Hudson at the General Offices, **3 Division Headquarters and 9 Other Supervisory Headquarters,** Scattered All the Way from Plattsburgh, N. Y., to Carbondale, Pa. This Magazine Goes Also to 16 Other Subordinate Officers Who Are in Training for Promotion to Supervisory Positions on This Railroad.

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS



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Dept. RS-11, Box 2017 Terminal Annex,
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Please send brochure describing the "new style" SUBMERSIBLE PUMP.

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LET US SHOW YOU how...

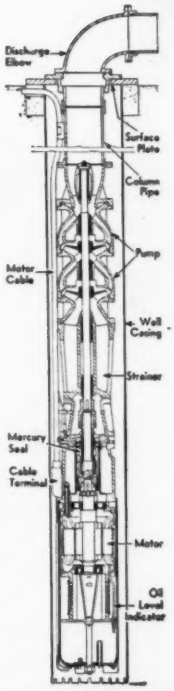
Styles have changed

IN PUMPS, TOO

The modern SUBMERSIBLE is a short-coupled pumping unit consisting of an electric motor mounted below a deepwell turbine pump to which it is direct-connected. BOTH THE MOTOR AND THE PUMP OPERATE COMPLETELY SUBMERGED IN WATER. Whether the well is shallow or deep, *there is no long shaft* connecting a motor on the surface to a pump in the well. You can eliminate downtime and heavy expense for repairs and replacements, due to the rotation of the conventional long shaft rotating in many bearings—You can avoid excessive power bills from needless shaft friction.

The only rotating parts of the SUBMERSIBLE are inside of the steel case, filled with a high dielectric oil that prevents water from contacting the active portions of the motor and also serves to lubricate the ball bearings. The complete pumping unit is attached to the bottom end of the discharge pipe and is lowered in the well. A submarine type cable conducts electric power from a weatherproof metal switchbox on the surface to the submerged motor, and the water being pumped flows past the motor which is thus kept cool regardless of high surface temperatures, and is likewise protected down in the well when sub-zero weather is present.

No pumphouse is needed—only a weatherproof, tamperproof metal switchbox which may be mounted on a pole, platform or tower, safe from vandals or animals. This construction adapts the SUBMERSIBLE to local or remote, manual or automatic operation, and makes it ideal for installation in isolated locations where frequent inspection is inconvenient and expensive.



Hundreds of SUBMERSIBLES, representing thousands of horsepower, are in service today, including railway installations to which we can proudly refer you. The coupon above will bring you a folder containing full details of the SUBMERSIBLE.

Remember that the operating cost of an obsolete water pumping plant is almost certain to be excessively high. Give details of your pumping problems, and we will furnish definite suggestions and recommendations which should bring you worth while savings. There is no cost—no obligation—just mail the coupon.

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NEW MONITOR-TYPE CAB ON INDUSTRIAL BROWNHOIST DIESEL RAILROAD CRANES ALLOWS CLEAR VISION IN EVERY DIRECTION . . .

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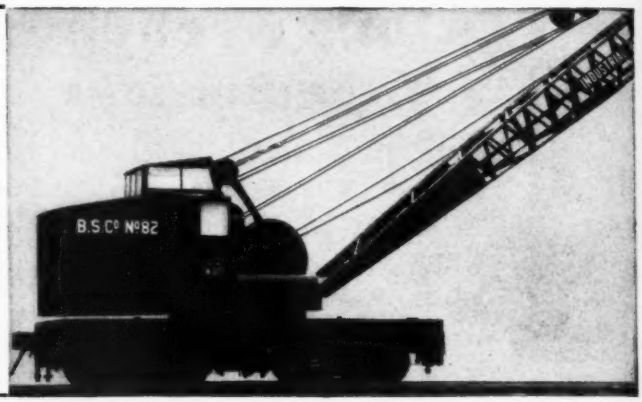
While giving 360° vision, better ventilation, and less noise, the patented monitor-type cab cranes conform to the standard clearances and provide ample head-room in the engine compartment.



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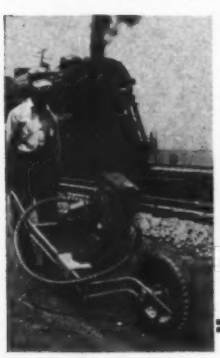

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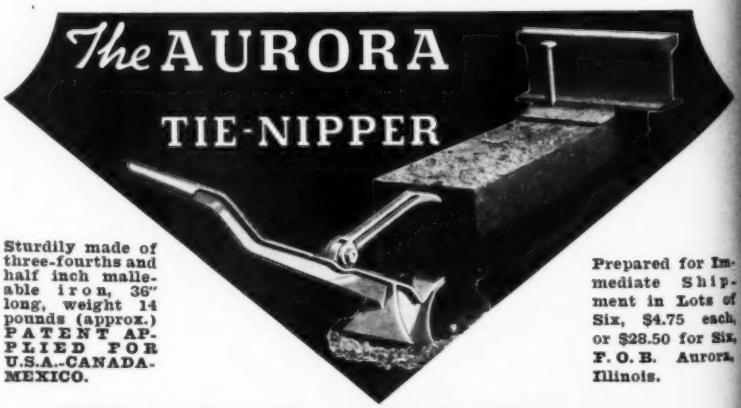

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